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# GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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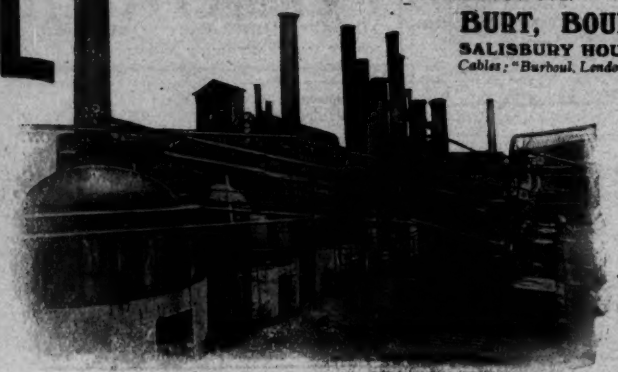

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VOL. CLXXI., No. 3253.] WEDNESDAY, SEPTEMBER 16, 1925. [77TH YEAR.


## EDITORIAL NOTES.

### The Irish Association and a Presidential Address.

AFTER a period of cessation from activity owing to the difficulties created by the war and the succeeding years, the Irish Association of Gas Managers was resuscitated last year. On that occasion, there were evidences of a desire, with a return to life, to cause the organization to grow into something really effective and potent. The Hon. Secretary (Mr. G. Airth) and the other moving spirits in the Association have since been unceasing in their efforts to bring this about; and they have appealed for the co-operation of all influential men in the gas industry of Ireland. This week the members are holding their second meeting since the return to life; and the programme gives good promise of ambitions being realized. A two days' meeting is being held; and to the aid of the Association men of high position in the industry's work have come, and are contributing to the programme. In the Presidential Chair of the Association this year is Mr. J. D. Smith, M.Inst.C.E., the Engineer and Manager of the Belfast Corporation Gas-Works. A stalwart in the gas industry, and with a record which shows an unwavering faith in organized co-operation in technical and commercial work, if Mr. Smith can do anything to help to organize completely the technical and commercial forces of the gas industry of Ireland, we know he will do it, for the sake of advancing the interests of gas throughout the land. Ireland requires that state of things as much as we do in England or Scotland; for there are the evidences on the part of the powers that be of a singular preferential friendliness towards the development of electricity supply. Probably that attitude will not be to the advantage of the country, or to those who have to bear the financial burdens. The time has arrived for the gas interests in Ireland, as in England, Wales, and Scotland, to stand solidly shoulder to shoulder; for the gas industry has to rely more and more upon its own inherent power and qualities, the production of economies through efficiencies in every part of its processes and operations, and the potential value that it can offer in its products. Competition encircles us; and it is gaining in the severity of attack, if not in success in diminishing the gas business. As a matter of fact, in the development of the use of gas, the industry never stood so well; and in the primary business, it has been, and is, expanding—competition notwithstanding. But there are plain indications of intensified rivalry. This is realized in Ireland as elsewhere; and thus—combined with the desire to be (within the limits of opportunity) as well organized as the other geographical quarters of the industry, so contributing to its solidarity and to the promotion of its interests—the aspiration for efficient unification of the executive men of the Irish gas undertakings is worth considerable effort to achieve.

This week we confine comment to Mr. Smith's Presidential Address, which, following up the lines of thought in part of his Address when President of the Institution of Gas Engineers, dealt with the position of the industry in relation to competition, actual and threatened. When one is working under the conditions of Belfast, with 460 B.Th.U. gas distributed and sold, through efficient engineering, management, and working, at 6¼d. per therm for ordinary purposes, and 5¼d. per therm for industrial uses, one can in pleasant circumstances examine competition, and view the strength of the industry in assisting in the solution of the national problems of coal conservation, co-ordination of the use of fuel, and atmospheric purification. But we cannot—having read his address with deep interest, and found it full of thrusts at competitive proposals—help having a little tilt at our Belfast friend. "The gas industry," he says, "has no apologetic attitude to take up. Still less need it waste time on destructive criticism of other proposals for the solution of the problem of smoke abatement." The chief proposals in this regard come from low-temperature carbonization and electricity. Later on, speaking of one particular variety of low-temperature carbonization plant, the President said the promoters "are not likely to deceive gas engineers, though it is well to utter a warning that they may influence members of committees and boards of directors who are not technical men." This being so, it follows that it is the duty of those in the position to do so to apply "destructive criticism" in order that those whose knowledge does not compass these matters may not be deceived, or, if they have been, that their new, but wrongly founded, beliefs may be corrected. This applies also to the electricity schemes. We know what has happened in this respect—how coal conservation, domestic and industrial economy, and national saving have all been utilized as elements in the case to induce political and legislative preference, and even financial support by the State. Without "destructive criticism" these things cannot be set right. Indeed, throughout, the address is composed of comparisons and facts from experience which constitute most deadly "destructive criticism" of the misrepresentation which has been rampant regarding these matters; and it is a valuable contribution to the industry's corrective propaganda. We, of course, realize Mr. Smith's attitude. It is that the gas industry's work lies in the direction of "providing fuel in a form so cheap and convenient that it will pay to use no other." That is an excellent ideal; it is one which Belfast has been pursuing with remarkable success. But all gas undertakings are not so far advanced as Belfast in that power which low-priced therms give in offering resistance to competition. And while they are pressing towards the goal, the competitors are actively at work on their schemes and their misleading propaganda. Mischief is being done, which must be tackled in the early stages.

However, the main theme of the address is the production of cheap therms and the relation of those therms to the competitors in the market, with gas coke and the low-temperature product intervening in the discussion. In dealing with the manufacture of gas, the President submits that the first duty of the engineer responsible for the management of a gas undertaking is to produce gas at the lowest possible price in view of the circumstances in which he is placed. But the problem is no easy one; it is affected by capital, labour, and maintenance charges. In this connection, reference is made to the remarkably searching paper, treating of the economics of gas production, which Mr. George Evetts contributed to the proceedings at the last annual meeting of the Institution of Gas Engineers; and the President paraphrases the author's dictum thus—"The cheapest gas to make under

"normal circumstances is got by making the maximum "number of therms per ton, at a calorific value which is "readily saleable in your district, in plant of the lowest "capital cost per therm produced, with the least labour "and maintenance costs on the same basis." When that is said, we have before us the essence of requirement. In association with this, we are gratified to find that such a leader as Mr. Smith deprecates the idea of taking the reactionary step of again stereotyping a universal fixed or standard calorific value. As he says, "that would be to deprive ourselves of the whole freedom won by the passing of the Gas Regulation Act; we should put out of our reach one of the most important factors affecting the cost of gas."

Then comes the interpolation as to gas coke, and the criticism of the claims of low-temperature carbonization. It is upon the remarks regarding the former that a comment or two may be made, from the point of view that there is so much in the address with which we are in agreement (as are all progressive gas men) that it is only where opinions may differ that there is value in discussion. The President says coke is our most important residual; no other residual has so marked an influence on the cost of gas. But the price of coke is subject to such violent fluctuations that it is, in his opinion, extremely unwise to give to this particular product undue weight in decisions regarding the policy of gas manufacture. Then he advises that the duty of the engineer is to improve the retail trade in coke; and he speaks approvingly of the designs of domestic fires for coke as put forward by Dr. Weyman and Prof. Boys. He adds: "From the point of view of "smoke abatement, the provision of domestic fireplaces "by means of which coke will become the popular fuel "is of immense importance." And later he remarks: "It "is in this direction—the provision of suitable fires and "stoves for the domestic use of such coke as is readily pro-"duced and prepared by gas-works as at present con-"structed—that progress will be made, rather than by any "drastic re-orientation of the gas industry on the produc-"tion of some new type of solid residual." It will be seen that, while the President emphasizes the importance of coke in the economics of gas production, he suggests that, in view of the violent fluctuations of its price, it is extremely unwise to give to this particular product undue weight in decisions regarding the policy of gas manufacture. Now what we really have to consider is whether we cannot make coke just as indispensable a commodity as gas, and then there will be no question as to undue weight being given to it in decisions regarding the policy of gas manufacture. The point is as to whether indispensability is to be secured by the provision of specially contrived domestic grates or by altering the constitution of our retort charges in such a way that (let us say, by quicker transmission of heat through the charge) economies will be promoted in manufacture, and a coke will result of such structure that it will be free burning under ordinary conditions. The position is at present one upon which no one can dogmatize; it is a subject for thorough investigation. And we are not without hope that the trend of technical operation is, through the force of circumstances, towards the critical examination of the only part of carbonization that has been neglected—that is, the charge itself—to ascertain whether or not through it economies and improvement of products are possible. The President may be right; but we cannot find the data to satisfy us that the route to bringing about a greater popularity of coke is viâ the grate, rather than by a change in the physical or structural characteristics of the fuel itself. This remains for determination. There are in mind the many millions of existing grates designed for coal burning; there is in mind the reluctance of people to spend the money necessary on a design suitable for the burning of a fuel of totally different properties. But if, by varying the characteristics of charges in existing carbonization plants, a fuel can be produced which can be used in established grates, and at the same time without prejudice to the economy of gas manufacture, what of that? Time and research must supply the answer.

Every reader will peruse for himself the President's "destructive criticism" on the subject of low-temperature carbonization; and (if the reader is a gas man) he will with satisfaction study the comparison of the cost of heating rooms by different agents. The figures show how closely per day the gas-fire comes to the coal fire under the conditions of costs in Belfast, and also how much farther the relative cost conditions remove electricity from consideration for the purposes of general heating. The difference is such that it is humorous really to regard the electric heater as a competitor. The cost per brake horse-power of the electric motor and the gas engine is also favourable to the latter. In both directions the price at which gas is sold is the predominant factor. Coming from Mr. Smith, the testimony to the merits of the gas-fired boiler for trade purposes is likewise valuable, as is also that regarding the excellent results that have been derived from the scheme of inspection of fittings on consumers' premises. The address, as we knew it would be, is eminently practical in subject-matter, and opportune in relation to the movements of the times.

## Town Gas for Small Powers.

THERE is a deliberate movement on foot for restoring the town-gas engine for small powers to its rightful position in the industry and trade. The time is opportune. The path of progress has been partly blocked by a variety of causes—such as the high cost of gas, the competition of the electric motor, the oil engine using cheap fuel oil, and the suction-gas engine, which can now be largely ignored owing to the high price of anthracite, and, in these days of heavy wage costs, the charges incurred in tending the plant. In special circumstances, the heavy oil engine has made considerable headway—especially where medium and large power units are required; but in the case of small and medium powers, the modern town-gas engine is well able to hold its own, both in respect of the oil engine and the electric motor. We need not to-day talk of the intrinsic advantages for power of town gas to the manufacturer in respect of availability, no storage demand, cleanliness, and the purity and constancy of the supply. They are obvious and attractive; and the price of town gas for industrial use has got down in most areas to a figure which is competitive, and will show economy to power users. Various prominent engineers have been strong in their advocacy of determined efforts being made to establish the small gas engine. We saw something of this in the Presidential Address of Mr. J. Ferguson Bell to the Institution of Gas Engineers; one part of the Presidential Address of Mr. J. D. Smith to the Irish Association yesterday dealt with it; and it has had treatment at meetings of the "B.C.G.A." and of Junior Associations of Engineers. The manufacturers of gas-engines are entering heartily into the work of exploiting the small town-gas engine, because they realize that there is a large field for it, which can be occupied by the joint efforts of themselves and the gas suppliers, and to the advantage of many industries and trades. An article on "Town Gas for Power" which appears in later columns shows how Messrs. Crossley Bros. have developed a small town-gas engine which possesses several distinctive features in design, and which, we believe, is destined to become a strong competitor of the electric motor, given a suitable price of gas. Independent engineers assure us that it has high-grade characteristics; and the makers inform us that its cost is low. The attention of gas engineers has been called to it by circular; and an attractive pamphlet has been issued for distribution among industrialists and traders who require power. The pamphlet has had such a heavy demand from gas engineers that we believe a second edition has had to be printed. The information in it is of a character which goes direct to the question of economy, which is the appealing point in industry to-day. The power load is a day one, and it continues all the year round. It is worth a special effort to realize more and more of it, and to retain it when obtained. Much can be done by the co-operation of gas suppliers and engine manufacturers to give town gas a large place in serving industry and trades. Special efforts are being made by our electrical rivals in all directions; nothing should be left undone by gas undertakings, both from the offensive and the defensive points of view, to gain and to retain all possible territory.

## Deficiencies in Declared Calorific Value.

IN the issue of the "JOURNAL" for Aug. 19 (p. 455), a paragraph stated that, according to a report to the Surrey County Council regarding a default by the Godalming Gas Company, the Gas Examiner had certified that the average calorific value of the gas supplied during the quarter ended March last was 3·2 B.Th.U. below the declared value, and that the Chief Gas Examiner had, under section 9 (4) of the Gas Regulation Act, decided that the revenue of the Company was thus improperly increased by £31 15s. 2d., and that this sum would have to be applied as provided by the Act. This being a Company, the sum named has to be deducted from the amount applicable to the payment of dividend on the ordinary capital for the year or half-year in which the quarter occurs, and has to be carried forward to the credit of the revenue account for the next following year or half-year in addition to any other amount which would otherwise have been carried forward; and the dividend which the undertakers may pay on their ordinary capital in respect of "such first-mentioned year or half-year" has to be correspondingly reduced. When the gas suppliers who make default are a local authority, then the sum by which the revenue has been improperly increased has to be applied towards a reduction of the price of gas in the next or some succeeding quarter.

An assumption appears to be abroad that the Godalming case is the first and only one that has come under the section. This is not correct. It is within our knowledge that in respect of deficiencies at least a score of determinations under the sub-section in question have had to be made between the latter part of 1922 and the end of 1924; and we should not be surprised to learn that there are a number this year (in addition to the Godalming one) awaiting decision. However, the determinations that have had to be made by the Chief Gas Examiner in respect of deficiencies have represented—at least so far as information is available—relatively small sums; and they have been in respect of both local authority and company undertakings. The fact that the number of cases is comparatively small to the total of undertakings working under the Act, and that no serious sum (in the cases known to us) has been involved, constitute a certificate to general good conduct on the part of the industry. As a matter of fact, the highest determination in any case of which we are aware was under £150, and other figures that we have are below £60, and as low as £4 odd. It is easy to see from these indications that no really large undertakings have been implicated. Had there been, there would have been determinations of more striking dimensions.

The information given here will be sufficient to correct any false impression that the Godalming case is the first and only one under sub-section 4 of section 9 of the Act. The number of cases there have been also indicates that the provision in the Act is necessary for the protection of the interests of the consumers—not that any undertaking would deliberately commit a fraudulent act, but the consumers are entitled to that for which they pay.

## Reducing Unaccounted-for Gas.

UNACCOUNTED-FOR gas we have always with us. It does not matter how great is the supervision that is given to the distribution system, how ideal is the accuracy of the meters, we shall never induce the unaccounted-for item to vanish entirely. Would that we could; but we have no complete control over the effects of condensation, pressure, and temperature. There is, however, the part of the unaccounted-for gas which is actual waste through leakage or defective registration; and it is upon this that wits and work must be exercised to produce reduction. And a considerable diminution can be effected, as all competent gas managers know, of the losses caused by injured and deteriorated mains, service-pipes, and meters, or by incompetent and badly supervised work. As was seen last week (p. 612), Mr. James Dickson, of Kirkintilloch, read a paper before the North British Association of Gas Managers, in which he dealt with this matter, and showed how by various devices he has been able to bring-down his unaccounted-for gas from 8 to 4·2 p.ct. during the past three or four years. When it is considered that the 4·2 p.ct. includes the volumetric loss due to uncontrollable causes, the figure suggests an excellent state of affairs, and is testimony to the efficacy of the work which Mr. Dickson has done in improving his distribution system, and in assuring himself that the fidelity of his meters in registration is beyond reproach. To neglect the distribution plant is the reverse of economy; and systematic work in this direction gives opportunities for many an improvement which is valuable to the future of a gas undertaking.

We are not proposing to follow Mr. Dickson through his narrative of work done in connection with his mains, services, and meters, which work has resulted so beneficially; but there are a few points which may be emphasized, or upon which a little comment may be made. Dealing with the causes of losses from the mains, the author referred to the densely populated condition of the subsoil; and to this state of affairs is frequently due damage to gas-mains which results in leakage. When, for example, the pipes of another public service are laid in the vicinity of gas-pipes, especially when placed at a lower level, unless the soil is of a very compact order (such as clay), there is a likelihood of the bed on which the gas-pipe is laid being loosened, and so weakened. This is a fruitful source of trouble in some gas-supply areas—particularly in these days of heavier and faster traffic over road surfaces, and therefore greater vibration and pressure. It necessitates watchfulness and supervision; and with modern surface constructions, no effort should be spared to avert danger from this cause. The use of the subsoil of roads for transmission purposes ought, in view of the prevailing conditions, to be accompanied by the obligation that, when work is being carried out in proximity to existing pipes and cables, every opportunity should, by co-operation, be given to the owners of the latter to assure themselves that there is no disturbance of the conditions which would prejudicially affect the stability of the property. This would be to public advantage. But inspection to ascertain that all is well when work is being carried out by fellow-tenants of the subsoil requires competent men with technical knowledge; and the busy gas manager in a moderate sized undertaking cannot always, with his multifarious duties, give the requisite attention to outside work of the kind. And road work cannot be delayed to suit personal convenience. Furthermore, Mr. E. Edison Stones, the Assistant General Manager at Glasgow, said in the discussion that he knows of no section of the Gas Department where money could be more easily wasted by burying inefficient work than in the mains and services section. This all points to the manager who has to depend largely on an outside foreman, having a man for the work of supervision and inspection who has had a technical training for his particular job, to enable him readily to detect weaknesses, or ascertain whether there are any menacing conditions which may cause trouble in future.

It is also seen that Mr. Dickson favours the proposition that Mr. Napier made at the spring meeting of the Association, that gas undertakings should be responsible for all pipes laid to the consumers' meters, excepting, in the first instance, those to be laid, at his own expense, by the owner or occupier of the premises from the line of boundary. At Kirkintilloch, the Gas Department have been replacing services to tenements by larger pipes; and while it has cost considerable sums to do this, the belief is that the ultimate results will justify the expenditure. This is present expenditure for future profit, as the carrying capacity of the new pipes is such that additional appliances can now be connected, which will mean an expansion of gas consumption. In other words, the enlarged service-pipes provide new opportunities for cultivating the increased use of gas. Another related point is that the Corporation have made regulations to the effect that no pipes must be laid until specified by the Department, and that they must be inspected by an official before being covered up. Naturally, when the supply has been installed under the supervision of the Department, there is greater willingness to undertake future repairs. Another point in the author's advocacy is the appointment of a competent meter surveyor; and the experience of the De-

partment in instituting in 1921 a special branch for meter inspection and repairs has been fully justified.

Just a couple of other interesting and suggestive "titbits" from the paper. The Gas Department in connection with their distribution work have insured themselves against third party risks; the insurance premium being based on the wages paid to outside workers, and amounts to about £30 a year. Another little wrinkle for selling additional gas-consuming appliances to prepayment consumers is this: In Kirkintilloch, the meters have not been altered since a reduction was made in the price of gas; and at the collections the prepayment consumers have a sum to be returned to them. They are given the option of having the money or utilizing it for the purchase of gas appliances; and through this a satisfactory business is being done.

We congratulate Mr. Dickson upon the success of his work in reducing the unaccounted-for gas in his area of supply, and upon the enlightened policy which is directed to the promotion of prospective advantage to both undertaking and consumers.

## The Unchanged Standard of Storage Capacity.

Among the interesting topics which engaged attention at the meeting of the North British Association, as reported last week, was that of the relation of effective storage capacity to present-day demand. The problem was submitted to discussion by Mr. James J. Scott, Engineer and Manager of the Cowdenbeath Gas Company, Ltd.; and he asked, What is the reasonable ratio of effective storage to maximum output in the light of existing manufacturing and distribution conditions? We have had changes the last decade or two all along the line from gas-manufacturing processes to the applications of the gas, and therefore of demand, with maximum peak loads concentrated into definite hours of the day in given areas of supply. Notwithstanding all the mutations, they seem to have ruled-out each other as factors so far as storage is concerned. In the present paper and discussion, we have experiences presented which show that the old rule of storage capacity of not less than a maximum day's supply still holds good, and is found to be perfectly satisfactory. This is, we believe, mainly due to two conditions—the greater flexibility of the manufacturing processes of to-day and the changes in the incidence of demand, which, of course, varies in different districts. This alteration in the incidence of demand is well illustrated in the remarks of Mr. J. W. M'Lusky in the discussion. Glasgow has a district of supply in which is merged the whole gamut of variable demand. In twenty years the sale of gas in the city has increased from 5900 million c.ft. to 8700 million c.ft., which is equal to 47 p.ct. Nevertheless, during the twenty years, there has been no occasion to enlarge the holder capacity—thanks to the shifting in respect of time of day of the incidence of maximum demand. This is the actual state of change in this respect: Dividing day and night consumption into twelve hours each, in 1904 the day consumption was equal to 44·9 p.ct.; and the night consumption to 55·1 p.ct. There has been an almost complete reversal of these percentages; for the day consumption (and on a larger total for the twenty-four hours) was equal last year to 54·6 p.ct., and the night consumption to 45·4 p.ct. But the change between summer and winter consumptions is even more striking. The percentage for the day period in the summer of 1904 was 37·7, and for the night period 62·3 p.ct. Last year the figures were respectively 54·5 and 45·5 p.ct. This levelling-up of demand is in gas supply economically beneficial.

The figures from Glasgow are highly interesting; and they go a long way to explain why it is the holder capacity there of twenty years ago is, despite the great increase in demand per annum, equal to requirement. The movement of demand has had the effect of securing more service from the existing producing and distribution plant, and the increased sale of gas all round of meeting overhead charges. The same point was made by the President (Mr. James Campbell) in his address; also by the author of the paper, as well as by Mr. John Wilson, of Wishaw and Motherwell, in his remarks during the discussion. From the change, the same beneficial effects upon working costs are experienced alike by undertakings large and small. The author pointed out that some engineers regard the capital expended on holder accommodation as dead or unproductive. So to describe such capital outlay within reason is a mistake; for adequate holder capacity is actively beneficial as a balancing medium between production and the variable demand, in promoting and ensuring economies in carbonizing, and in maintaining an adequacy of supply (given a distribution system of sufficient capacity) to the satisfaction of the consumer. Capital expenditure which has these effects is an important factor in the conduct of a gas undertaking, and cannot therefore truly be called "dead" or "unproductive."

As already indicated, the consensus of opinion at the meeting was that the provision of gasholder storage should not be less than the maximum twenty-four hours' supply. The author of the paper said: "While conditions have substantially changed compared with the old days, on balance the present-day conditions still warrant the twenty-four hours' factor of storage being retained as sound and proper." To this Mr. H. H. Gracie, of Edinburgh, subscribed, as did also Mr. M'Lusky, Mr. John Wilson, Mr. George Keillor, Mr. James Bell, and Mr. David Fulton. In fact, Mr. Bell enjoys at Dumbarton a storage equal to thirty-six hours' supply; and, in his opinion, twenty-four hours' capacity is the minimum that should be entertained. Thus Scotland is satisfied that the retention of the old standard of storage accommodation for the maximum day's demand is the correct thing; and, if anything, the tendency is rather to exceed it in view of the economic issues. But a point can be reached in capital expenditure when economic issues would cease.

One other matter. In the paper Mr. Scott dealt with the subject throughout in terms of cubic feet. In these days, when speaking of effective storage, it would be better to state capacity in therms than in cubic feet. The reason is obvious, with calorific values ranging from (say) 400 to 560 B.Th.U.

### The "Electrical Review's" Sense of Honour.

We protest strongly against what we regard as anything but honourable conduct on the part of the "Electrical Review." Had anyone suggested to us that the paper would publish a letter marked "Private and Confidential," we should have scouted the idea as absurd. But the fact is our contemporary has done this, and has further belittled itself in the eyes of men of honour by acknowledging in the lines with which it prefaces the communication that upon it the words "Private and Confidential" appear. Apparently someone else is guilty of a breach of confidence in forwarding a copy of the letter to our contemporary; and it would be interesting to the gas industry if the person or persons would supply us with his name or their names, for we should not hesitate to give the information the publicity it deserves, in order that the gas industry might show in a proper manner its disgust over the traitorous action and breach of etiquette. The letter is one which Mr. B. B. Waller, in his capacity of Chairman of the Council of the Society of British Gas Industries, addressed to the members on the subject of a proposed special publicity campaign this autumn, and in which he invited subscriptions for the purpose. That letter was marked "Private and Confidential." The dignified course for the "Electrical Review" to have taken would have been to have returned it to whoever had been mean enough to forward it. Instead, our contemporary published it. We cannot compliment it upon its conduct.

### The North British Address.

In the "Journal" last week, attention was called in our editorial columns to the Presidential Address of Mr. James Campbell to the North British Association of Gas Managers. It was then stated that we believed good service would be done through it in obtaining publicity in connection with the campaign against any preferential treatment of electricity by the Government, and especially in the direction of special financial aid. All other industries, which are equally bene-

ficial to the country, have had to develop solely by their own exertions and from their own resources; and no exception should be made in favour of the electricity industry. We are gratified to find that the part of Mr. Campbell's address which refers to this matter received publicity in a number of influential papers—notably the "Dunfermline Journal," the "Glasgow Herald," the "Glasgow Daily Record," the "Scotsman," the "Dundee Advertiser," and the "Dundee Courier."

### Testing and Stamping Gas-Meters.

It will be remembered that for some time past the Central Executive Board of the National Gas Council have had under consideration the question of the inconvenience which some gas undertakings suffer through the remoteness of the stations at which meters can be officially tested and stamped. This condition involves for them somewhat heavy expenses for transport, and naturally the journeyings to and fro are not to the advantage of the meters themselves. In the minutes of the Central Executive Board published in this week's "Journal," there is further reference to the matter; and a hint is given which may be of considerable service to gas undertakings who are not well situated in respect of meter-testing stations. It is mentioned that in the Burnley Corporation Act for 1925, a section appears which permits the establishment of meter-testing stations by the Corporation. This has given birth to the suggestion that gas companies who are prejudiced by having to send their meters a distance for official testing and stamping will no doubt consider the desirability of inviting their local authorities when next in Parliament to obtain a similar clause, enabling them to set up stations.

### Trade Union Congress.

It will be seen from an article in our "Miscellaneous News" that the Trade Union Congress devoted a considerable amount of time last week to the congenial task of discussing how, by destroying the present industrial structure, wiping the capitalist system off the face of the earth, and obtaining for the workers the control of industry, the conditions of the latter could be bettered. Of course, they would not be improved; the workers would be involved with the rest of us in the general devastation which would result from the materialization of such fanatical ideas. The country, however, pursues its courses, as though oblivious to all these menaces to the very fundamentals of its existence. It is time, however, that more serious attention was given by the Government to the insidious workings of those who are seeking to undermine our industries through those who find employment in them.

### The Coal Commission.

Towards the end of last week, Sir Herbert Samuel, Chairman of the Royal Commission which is to inquire into the economic position of the coal industry, was busy at the Mines Department of the Board of Trade preparing for the preliminary stages of the inquiry. A private meeting of the Commissioners was held on Monday to determine the course of procedure; and there is to be further consultation on Friday. A large body of evidence will be forthcoming; and the inquiry is likely to commence within a week.

**Eastern Counties Gas Managers' Association.**—The ancient and historic town of Stamford, which contains many objects of exceptional interest, has been selected for the autumn meeting of the Association, which will take place on Wednesday afternoon next, Sept. 23, at 3 o'clock, in the Town Hall, when the retiring President, Mr. F. A. West, of Newark, will take the chair. In addition to the formal business, a paper will be read by Mr. J. F. Simpson, of Scunthorpe, who will give particulars of recent alterations and developments in gas manufacture in his town. Members are invited to meet at the Stamford Gas-Works at 2 p.m., where light refreshments will be provided by the kindness of the Chairman and Directors of the Gas Company. For Thursday morning, at 10 a.m., a visit has been arranged to the firebrick works of Messrs. Williamson Cliff, Ltd. Mr. Albert Cliff will conduct the party, and there will be demonstrations of the processes of manufacture of gas retorts and other fireclay products. The members will be entertained at luncheon by Mr. Cliff; and this is to be followed by a motor drive to Burghley House.

## PERSONAL.

The local "Evening Argus" says that "Hastings is honoured in the election of Mr. C. F. Botley as this year's President of the Institution of Gas Engineers. Mr. Botley succeeded his father as Engineer and Manager of the Hastings Gas Company; and his control has been marked by the erection of the new works at Glyne, a fair share of the difficulties incident to industrial life to-day, and a steady development in the business of the Company. As for the difficulties, it might almost be said they arose to show the Directors how strong was the man into whose hands so much responsibility had been placed. The works at Glyne Gap—and no gas-works have any pretence to æsthetic beauty—are of such a nature, and were built so much ahead of their time, that the area of the Company is now enlarged without any huge capital expenditure. In Mr. Botley the profession will find what they expect to find—a man who will fill the highest honour in the profession with a purposefulness which has marked all his life, and an intent to be of service to the public outside his profession as well as within its limits."

An interesting event took place recently when, on behalf of the Directors of the Hornsey Gas Company, Mr. J. W. Buckley, the Engineer and General Manager, presented a cheque for ten guineas to each of two junior chemists—Mr. P. R. Crerar and Mr. H. Pike—who lately obtained the degree of B.Sc. (with Honours), London University.

## OBITUARY.

The Stanton Ironworks Company, Ltd., near Nottingham, have unfortunately lost by death the services of Mr. J. M. Paul, their Blast Furnace Manager. Mr. Paul was laid to rest in the village of Stanton-by-Dale on Tuesday, Sept. 8.

## ELECTRICITY SUPPLY MEMORANDA.

Among articles which we had preserved for future reading is one, published in the "Electrical Times" for Aug. 20, on the subject of "Developing the Domestic Electric Market." It is by Mr. Arthur G. Harrison; and

**Brains and Enthusiasm.**

there are in it points which may be (we hope profitably) impressed on the minds of many gas men as upon those of electrical men. In one place, the author refers to the success of an electrical engineer, who took charge of a district where previously there had been little interest shown in the cultivation of electrical business. He entered upon his new duties with enthusiasm and brains, which are rightly described as "priceless possessions." This engineer studied local conditions, and the peculiarities of the population. He got round their difficulties, and evolved a scheme of development which benefited both the supply undertaking and the consumers. The figures given as to appliances placed in a town where one would not have expected much demand for them unless the price of energy is abnormally low (this is not stated) show that enthusiasm and brains in promoting a sales scheme were applied to good purpose from the point of view of the undertaking. We are afraid that in some gas undertakings, brains are not sufficiently keen, or are not exercised with sufficient enthusiasm, to show originality in the matter of business development. This electrical engineer went in a scientific way about attacking the work which his predecessor had left undone. He studied (as already said) local conditions and the peculiarities of the population as a preliminary to the formulation of a scheme. Time and again, the advice has been given in the gas industry that responsible gas officials who have not already made methodical study of local conditions with the view to business development should have a census taken of the gas appliances in use in the district and the openings for new connections. Such a census, with the statistics maintained to date, is of the utmost value in assisting in the work of cultivating new business; and the methods of procedure in utilizing the information must be the work of brains, coupled with diplomacy. In business development, brains and enthusiasm are (as the author says) "priceless possessions."

**Service is Good Propaganda.**

We will not comment upon the little prejudice that Mr. Harrison shows, or upon his little inflations of statement, in respect of electricity; but his article is a reflection of the ardent advocacy which is now found, and which is spreading, of two lines of conduct in connection with the work of sales development. The one is the imperative need of explaining to consumers how appliances should be used to best advantage; and the other is the necessity of undertaking the repair and maintenance of all appliances sold and hired. Mr. Harrison is insistent upon this policy; and he

is merely an example of many electrical men to-day. We found it jutting out from papers and discussions at the last annual conference of the Incorporated Municipal Electrical Association. And hardly a week passes without finding the gospel of maintenance being preached somewhere in the electrical world. It is a correct thing in competitive industries such as gas and electricity. It was started in the gas industry; we must have a care that this golden method of business protection and development does not grow and spread with greater rapidity in the electricity industry than in that of gas supply. In one place in the article, we find Mr. Harrison saying that the general scheme of business development "resolves itself into two main sections—propaganda and service." In another place, he says: "Above all, maintain and repair all appliances sold and hired, and help the housewives whenever any little trouble arises with an appliance." Again: "It must be remembered that women are not usually of a mechanical turn of mind, and that a large percentage of men are not 'handy men,' so that a slight defect or little trouble may condemn an appliance a few hours after its installation. For instance, a vacuum sweeper is an article in use every day; and if some slight trouble arises, the housewife is not going to wait a week for repairs to be finished. The solution of such a difficulty as this lies in service and maintenance." Mr. Harrison has evidently in view the small undertaking as well as the large one, because if maintenance is essential to the development and preservation of business to a large undertaking, it is equally important to a small one with restricted opportunities. That his eye is upon the small undertaking is seen by this paragraph, which refers to one maintenance man only:

> The supply undertaking needs to keep a maintenance man whose sole occupation is to repair defects in appliances and to visit housewives, advise them how best to use their appliances, and remedy any little troubles on the spot. If an appliance must be taken away to the repair shop, then another must be immediately put on loan in its place. This service attempts to keep customers satisfied, not only with the articles they use, but with the organization that promotes their use.

The return through satisfaction and the development of business will, in Mr. Harrison's view, well recoup the expense to the undertaking of this maintenance work.

**Modern Girls and a Tendency of the Times.**

Another point is suggested by the article. We talk of gas and electricity being labour-saving, and the former is also a money economizer. Fortunately a modern tendency is to utilize labour-saving appliances for two reasons, which by the way are hostile to each other. The one is the servant difficulty, and the other is the desire for more leisure. The servant difficulty is opposed to leisure; but gas comes to the rescue. The modern girl, her occupations, her recreations, and general environment are factors in the desire to save domestic labour. We have to get out of the way of treating the modern girl in the same easy-going fashion as her grandmother. She is on the look-out for methods which will subscribe to her desires and mode of living; and she will favour those methods which will give her the highest economy and efficiency in result. Mr. Harrison naturally does not say those methods are provided by gas; he is out and out for electricity. But the point he makes is convertible to gas, and with very good reason. We will quote what he says:

> It is an excellent sign of hope for supply stations, contractors, and manufacturers alike, that the 1925 girl is modern enough to refuse domestic slavery as an essential part of marriage, and will jump at the chance of doing household work in the easiest way—the electric way. But she needs help, and she is not an electrical engineer. It is up to the supply companies to give her a hand; a humane task, carrying with it the inspiring combination of public service and profitable business. What more could be desired?

It will be seen how largely public service (which includes maintenance) is utilized as the basis of this article on business development in electricity. It reflects a trend in electrical thought and practice. Those responsible gas men who prefer to stop their activities at the meter index had better note the fact, and profit by it. There is room for much conversion.

**Hiring Finance.**

We wish our electrical friends in their annual accounts would give a more detailed statement as to the apparatus installed for the use of electricity for purposes other than lighting. Take Glasgow as an example. In the annual report of the Committee, all that is stated is that there is a noticeable increase in the number and variety of appliances installed for the consumption of electricity other than for lighting in domestic and business premises. In domestic premises, there are upwards of 32,000 appliances—heaters, irons, cookers, cleaners, &c.—equivalent to a demand of 37,650 kw., and in business premises over 12,900 pieces of apparatus, equivalent to a demand of 18,860 kw., or a total of over 44,900 appliances, with a demand of 56,510 kw. Of these appliances, it is mentioned that 6991 are hired-out by the department. Stating the aggregate of appliances does not give information as to how each branch is prospering. It will be noted, however, that there are connected 32,000 pieces of domestic apparatus and 12,900 of the industrial or trade class—together 44,900. Of these only 6991 are, as already said, hired-out by the department. Turning to the revenue account, it is seen that the rental of motors and other apparatus let on hire amounted last financial year to £4450 10s. That is a small sum. On the expenditure side of the account it is seen that "repairs of motors and other apparatus let for hire" amounted to £10,426 9s. 11d., and that the sum written-off motors, cookers, and arc lamps (10 p.ct.) was £3565. The rental received is insignificant compared with these charges; and they are low-priced units which are supplied to the apparatus. On the figures as they stand, the hiring business does not appear to be paying its way. But perhaps there is an ameliorating explanation lurking somewhere which we have been unable to discover.

**High Illumination and Fatigue.**

There has been considerable and persistent advocacy of an increase in the standards of lighting for factory and workshop purposes. This tendency has, there is no question, a material effect on the improvement of the output of the worker, as well as on the quality of his work. But another point is raised by a correspondent (signing himself "Enquirer") of the "Illuminating Engineer," which suggests that, while higher illumination has a beneficial result upon productive efficiency, there may be an attendant effect in producing nerve strain, owing to the more intensive effort which the worker puts into his operations. He does not say positively that this is so; but he submits it as a suggestion for the consideration of those who are advocating the higher standards of illumination. He considers that during the working period, it is advisable to approach as nearly as is economically possible to the degree of illumination conducive to the greatest ease of work; and this appears to be the critical point for decision. He imagines that few illumination engineers would think that an illumination up to (say) 50 or 100 foot-candles would in itself cause fatigue, provided that the eye sees only objects of moderate brightness, and that severe contrast and glare are avoided. Granted that relatively high illuminations do not in themselves induce ocular fatigue, and also that, by their psychological stimulating effect and by rendering work easier, they enable output to be increased, can it ("Enquirer" asks) be said that this increased output is accompanied by fatigue? Better lighting removes handicaps to expeditious and accurate work, so that, assuming the output is the same as before, human effort would be saved, and there would be less fatigue. If, however, the worker is stimulated by the higher illumination to put forth greater efforts, may not this involve some additional strain, even though he is more efficient? The objection that might be raised against "super-illuminations" on this ground would be merely part of the general reproach against modern industrial methods—so much more work is done in a given time than during the past that nerves are apt to suffer. In view of these considerations, the correspondent thinks that advocates of higher illumination would be wise to dwell upon the fact that it removes needless handicaps to smooth and efficient working—and thus enables things to be done with less effort—rather than upon its presumed influence in enabling or inducing people to get through more work in a given time.

## Estimating Gas Consumption for House Heating.

About 40 p.ct. of the total load at Battle Creek (Mich.) is industrial gas; and the maximum use of this occurs during the summer months. Therefore any load which can be secured during the winter takes the place of the summer use of industrial gas at 65c. per 1000 c.ft. In those circumstances an intensive house heating campaign was started, particulars of which were given by Mr. D. H. Frazer, jun., in a paper which he read at the annual meeting of the Michigan Gas Association. In this he stated that for the coming year the gas undertaking expect to have fifty house-heating customers burning an average of 600,000 c.ft. a year, which will amount to 5 p.ct. of the total annual sales. For arriving at the probable gas consumption for heating a house, the author said that estimating the figure from the amount of fuel previously used is a fairly satisfactory method, where the characteristics of the house owner are not known. One ton of coal as ordinarily burned is equal to 30,000 c.ft. of gas as ordinarily burned. The customer using 20 tons of fuel, therefore, would use approximately 600,000 c.ft. of gas during the heating season. His experience seems to indicate that a compromise taken between the consumption figured on the tons-of-fuel basis, if it is lower, and the consumption figured on the radiation installed will be fairly accurate. In other words, if the customer says he uses 18 tons of fuel, and has installed 1000 sq.ft. of radiation in a hot water plant, he would estimate that the customer would use 600,000 c.ft. of gas. If he had 800 c.ft. of radiation, and still used 18 tons of fuel, the gas undertaking would make the estimate on the fuel basis, and calculate the consumption at 540,000 c.ft. of gas.

## TARMACADAM ROAD AT WEMBLEY.

It was reported at a recent meeting of the Central Executive Board of the National Gas Council that the roadway forming part of the Tar Exhibit at Wembley had been relaid. The work was commenced after closing time on a Saturday, and the old road was broken up and the new road laid and completed by Sunday afternoon. By Monday morning the road was perfectly hard; and it is a remarkably good example of what can be done when suitable tar is used and the tarmacadam properly made and laid.

The following is the

SPECIFICATION.

*Tar—*

| | |
|---|---|
| Below 170° C.—Water 0·20 p.ct. Oil 0·34 p.ct. | 0·54 p.ct. |
| Between 170° C. and 270° C. | 9·39 p.ct. |
| „ 270° C. and 300° C. | 5·82 p.ct. |
| Free carbon | 19·52 p.ct. |
| Viscosity (25° C.) | 105 seconds. |

*Aggregate—*

Hard limestone graded.
Bottom coat, 1½ in. to ⅞ in.
Top coat, ⅜ in. to ¼ in.

*Method of Mixing—*

The aggregate dried and warmed in rotary drum-type machines and coated at a temperature of about 90° Fahr.

Tar heated to about 180° Fahr. and 5 gallons of tar used per ton of aggregate.

*Method of Laying—*

The tarmacadam was unloaded and laid within four days of mixing. The foundation consisted of a bed of clinkers thoroughly consolidated to a depth of 2 in. The bottom coat was consolidated to a depth of 2 in., the top coat was consolidated to a depth of ¾ in. The road set within 24 hours of laying.

## NATIONAL GAS COUNCIL.

### Meeting of Central Executive Board.

The Central Executive Board of the National Gas Council met on Tuesday, the 8th inst., at the Hotel Rubens, Buckingham Palace Road, S.W.—Mr. D. MILNE WATSON in the chair.

ROYAL COMMISSION ON THE COAL INDUSTRY.

It was agreed that the National Gas Council should apply immediately to be heard before the Royal Commission on the Coal Industry, and that Mr. D. Milne Watson, as President of the Council, should, if necessary, give evidence on their behalf.

ELECTRICITY.

It was reported that the Prime Minister had announced in the House on Aug. 5, in reply to a question, that no statement with regard to electricity development would be made that session.

Reference was made to a communication sent out recently by the Electricity Commission to all authorized electricity undertakers with a view to encouraging and extending the use of electricity for domestic purposes—which confirmed the fears expressed by the gas industry that an attempt would be made by the electrical industry to improve their load factor by "filching" from the gas industry their domestic load, by the aid of a Government subsidy.

PARLIAMENTARY.

*Public Health Act*, 1925.—It was reported that this Act received the Royal Assent on the 7th ult., and that the amendments which were pressed by the Council, acting in conjunction with the other Public Utility Associations, had been incorporated.

*Roads Improvement Act*, 1925.—It was reported that this Act received the Royal Assent on the 7th ult., and that the Council, acting in conjunction with the other Public Utility Associations, had secured certain amendments of importance for the protection of public utility undertakers, and, in particular, that compensation should be recoverable if the undertakers were injured by the exercise of any of the powers of the Act.

*Statutory Gas Companies (Electricity Supply Powers) Act*, 1925.—It was reported that this Act, under which statutory gas companies might apply for Special Orders under the Electricity Supply Acts, and might use their funds in the promotion of such applications, had also received the Royal Assent.

*Testing of Meters.*—Members were reminded that, under the Sale of Gas Act, 1859, provision was made for the establishment of meter testing stations, but that unless a borough had adopted the Act within the period prescribed therein they could not do so thereafter; the result being that boroughs which came into existence after that date have no powers whatever in this matter. It was reported that the Burnley Corporation Act, 1925, contained a section permitting the establishment of gas meter testing stations by the Corporation. It was suggested that gas companies who were prejudiced by having to send their meters a considerable distance for stamping purposes would no doubt consider the desirability of inviting their local authorities, when next in Parliament, to obtain a similar clause enabling them to set up meter testing stations.

*Northampton Gas Special Order.*—It was reported that this Order came before the Special Orders Committee of the House of Lords, who decided to report to the House that further inquiry was necessary. The Order had now been sent to a Select Committee of the House of Lords, and it was expected that the case would be heard about the end of November.

## CITY AND GUILDS EXAMINATIONS PROGRAMME.

### Arrangements for the Session 1925-26.

Prospective candidates for next year's technological examinations of the City and Guilds of London Institute will be glad to learn that the information they need in order to proceed to the carrying out of their intention is now available, in the official programme, which is published by John Murray, of Albemarle Street, London, W. The price is 3s. 6d. net (or 4s. including postage), and copies may be obtained from Messrs. Lamley & Co., Nos. 1 to 5, Exhibition Road, London, S.W. 7, or from any bookseller. All inquiries relating to the work of the Department of Technology, it may be added, should be addressed to the Superintendent, Department of Technology, City and Guilds of London Institute, No. 29, Roland Gardens, S.W.

In the programme will be found set out the general regulations, and syllabuses for examinations in technological subjects and for teachers' certificates. Among the principal alterations in the programme now before us, when compared with its predecessors, it is noted that, in connection with the examinations in Gas-Works Practice, Gas Supply Practice, and Gasfitting, new regulations and syllabuses have been introduced. Also a separate paper will be set in Elementary Science in each examination.

As is customary, the names are published of the members of the Advisory Committees, and in addition the Department state that they are in a position to avail themselves of the advice of a number of bodies, including the Advisory Committee of the Institution of Gas Engineers. In connection with Gas-Works Practice and Gas Supply Practice, the name of Mr. Charles Hunt appears as Honorary Consultative Examiner. The Active Examiners for the year 1925-26 in subjects which more particularly concern readers of the "JOURNAL" are: Coke and Bye-Products Manufacture, Mr. C. P. Finn; Coal Tar Distillation and Crude Intermediate Products, Mr. F. M. Potter; Gas-Works Practice, Mr. J. Terrace; Gas Supply Practice, Mr. J. P. Leather; Gasfitting, Mr. W. L. Westbrook; Elementary Science (in connection with the three last-named examinations), Mr. W. E. Harrison; and Heating and Ventilating Engineering, Mr. A. H. Barker.

The following are the dates fixed for next year's examinations: Coke and Bye-Products Manufacture, Wednesday, April 28; Coal Tar Distillation and Crude Intermediate Products, written, Thursday, April 29, and final, practical, Saturday, May 1; Minor Course in Gas-Works Practice, written, Saturday, May 8, written paper on Elementary Science, Friday, April 30; Minor Course in Gas Supply Practice, written, Saturday, May 1, written paper on Elementary Science, Friday, April 30; Gasfitting, written, Grade I., Grade II., and Final, Monday, April 26, written paper on Elementary Science, Friday, April 30, Grade II., and Final viva voce, Saturday, April 24, Grade II. and Final, practical, Saturday, April 24; and Heating and Ventilating Engineering, Grade I., Friday, April 30, Grade II. and Final, Wednesday, April 28. In connection with the syllabus for each examination, candidates will find, in an appendix, a list of text books and works of reference bearing upon the subject of the examination, as well as the names of appropriate periodicals. The rules show how the Institution of Gas Engineers and the City and Guilds of London Institute are co-operating in the matter of the granting of certificates.

The Society of British Gas Industries offer prizes of £5 5s. and £2 2s. to the first and second candidates respectively at the final examination in Gas-Works Practice, Gas Supply Practice, and Gasfitting, provided that candidates are eligible under the regulation which debars teachers or persons registered as teachers from competing for prizes. Subject to a like stipulation, Messrs. Ernest Benn, Ltd., offer as prizes a copy of "Distribution of Gas," by Walter Hole, to the candidate who obtains the highest marks in Gas-Works Practice, and a copy of "The Scientific Promotion of Gas Sales," by Arthur Coe, to the candidate who obtains the highest marks in Gas Supply Practice. The Institution of Heating and Ventilating Engineers also offer prizes in their special subjects. In addition to these, silver medals are offered by the City and Guilds of London Institute on the results of the final examination, and bronze medals on the results of the examination in the grade next below the final, in all technological subjects.

# IMPROVEMENTS IN THE WORKING ARRANGEMENTS OF THE BOYS CALORIMETER.

By HERBERT C. HIGGS, Gas Engineer, Basingstoke.

In presenting the following particulars, it will be understood that there is no pretension to the discovery of any new principle or original conception, nor is there any intention to depreciate or undervalue the excellence of the standard calorimeter; the object being simply to explain the application of certain improvements which have been found useful in the daily routine of gas testing, with a view to facilitating the working operations of the Boys calorimeter prescribed by the Gas Referees and sent out by the makers.

Those whose duty it is to make frequent tests will have discovered that the cork connections used for fixing the thermometers in the water inlet and outlet are not all that could be desired. Often there is some difficulty in adjusting them so as to keep the thermometers in a perpendicular position. Again, if the corks are not pressed firmly down, a sound joint is not secured. Owing to air locking within the calorimeter, it is frequently necessary to take out one of the thermometers, to give vent; and this is troublesome when the cork is very tight. In the plan adopted, which has proved a great convenience, metal unions similar to those in use for the test meter thermometer have been substituted for the cork connections.

To relieve the calorimeter when it is air locked, so as to obtain the necessary regular water flow, a tee connection is placed on the cold water inlet, to which is attached a small brass cock and funnel. When the calorimeter becomes air locked, the opening of the small cock is sufficient to give vent, and hence there is no need to disturb the thermometer connections. The funnel catches any water that may be blown out by the escaping air bubbles, and thus prevents it being splashed over the other parts of the apparatus. As the thermometers are required to be interchanged periodically, the metal union connections make the operation simple, and minimize risk of breaking the tubes.

Another source of danger to the thermometers is the spring clip which holds the sight glasses for observation. In the process of testing, these glasses have to be moved occasionally; and unless handled with care, the thermometer tube will be broken. In the improved arrangement the sight glasses are attached to separate standards, and can be handled without touching the thermometer tubes—a matter of some importance, having regard to their sensitive character and their function.

The most valuable feature which has been introduced, however, is the method of raising the calorimeter from the soda solution, and placing it over the burners. To effect this with ease and cleanliness, a simple lifting and travelling arrangement has been devised which makes the work of testing more agreeable in every way, and in practice has been found to save time, as well as to conduce to more accurate observation.

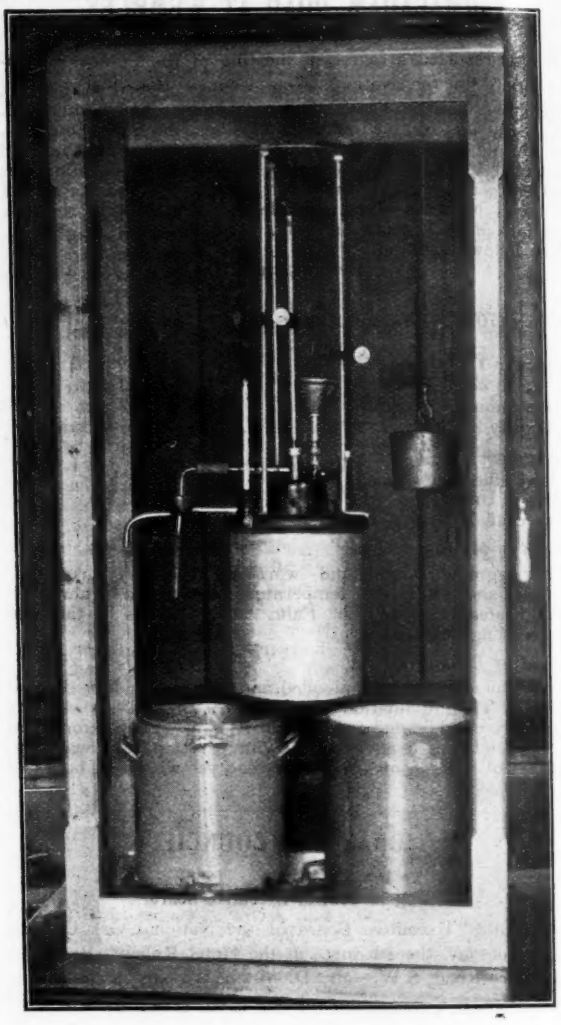


FIG. 1.—THE FRAMEWORK OF THE CALORIMETER AND THE GENERAL EQUIPMENT.

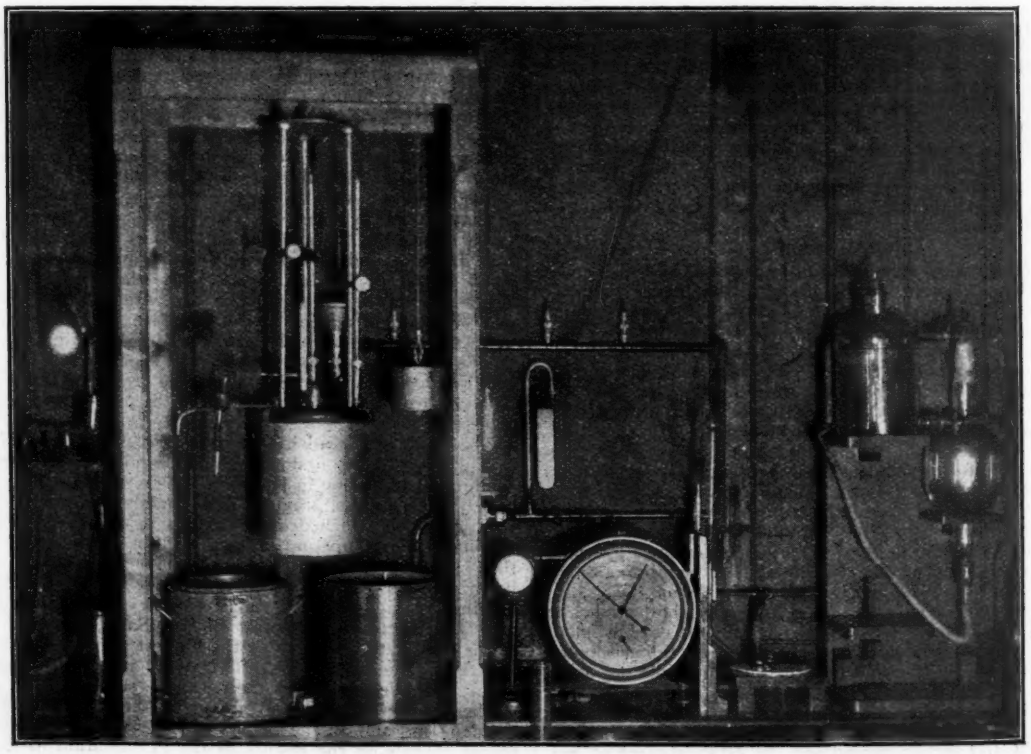


FIG. 2.—THE CALORIMETER IN POSITION ON THE TESTING BENCH.

To transfer the calorimeter from the solution to the burners is generally a somewhat messy operation. From the nature of its construction, the calorimeter, when lifted out of the liquid, continues dripping for some seconds; and if it is put over the burners before this ceases, the chances are that one or both of the lights are put out by drops falling upon the nipples. Moreover, in transferring the calorimeter, the drops splash other parts of the apparatus; and even the clothes of the examiner are not immune from being soiled. Again, in placing the calorimeter over the burners, if it be done quickly or with a jerk, the lights are extinguished, thus causing annoyance and loss of time.

The lifting arrangement consists of three vertical standards fixed to the wooden top of the calorimeter, and carried to a height slightly above the two thermometers. Two of these standards serve as supports for the sight glasses, which are provided with suitable adjusting screws for moving them up or down as required. The three standards are fastened at the top to a metal plate, to the centre of which is attached a small wire rope passing over two grooved pulleys, with a weight on the end sufficient to act as a counter-balance to the calorimeter. The two grooved pulleys are fixed to a travelling carriage running on frictionless bars at the top, and, by means of a small chain with hand pull on each side, the carriage may be freely moved over the required distance from the vessel containing the soda solution to the burners, and *vice versa*.

The counter-balance enables the operator to raise the calorimeter out of the solution with ease, allow it to remain over the vessel until the liquid ceases to drip, move it to the burners, and, finally, to place it in position. All this can be done with great steadiness, so that there is no danger of extinguishing the lights either from drops falling on the nipples or from undue pressure on the air cushion of the calorimeter. Should it be necessary to examine the burners or relight them if extinguished, then the raising of the calorimeter is a simple matter.

The lifting and carrying arrangement is supported at the top of a wooden frame; and at the bottom of this is placed the vessel containing the soda solution, and beside it the calorimeter. The whole equipment is compact, and presents a strong and neat appearance.

Apart from the general arrangements already described, an attachment has been made by which an electric bell is set ringing should the water supply to the calorimeter cease or be dangerously diminished. This is accomplished by the overflow from the small vessel which regulates the head of water supplying the calorimeter.

The whole of the arrangements in the foregoing description can be carried out without any considerable expense, and may be varied in certain details to suit the taste or convenience of engineers or their assistants. The two photographs will, it is hoped, make the description more intelligible. Fig. 1 shows the framework of the calorimeter and the general equipment, and fig. 2 the same in position on the testing bench.

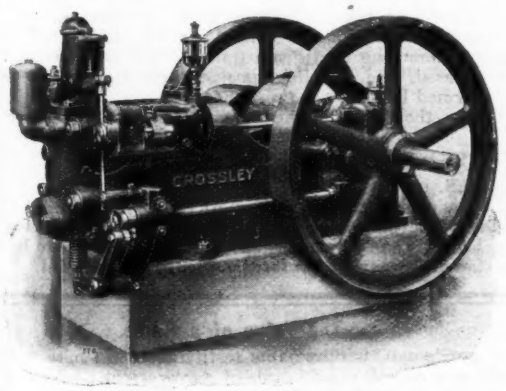
The improved apparatus may be seen in use at the Basingstoke Gas-Works.

# TOWN GAS FOR POWER.

### A New Type of Small Town Gas Engine, with Distinctive Features

A question frequently asked is why the town gas engine is not more generally used to-day for power purposes. No doubt this is due to competition both from the electric motor and from the oil engine using cheap fuel oil. The suction gas engine was at one time another serious rival, but the comparatively high cost of anthracite fuel, together with present-day attendance costs in operating the gas plant, furnish reasons why this type of prime mover has not had a more extended use during recent years.

The heavy oil engine, cold-starting type using residual fuel oil, has made rapid headway and become a serious competitor to the town gas engine where medium and large power units are required. It must be admitted that the town gas engine has difficulty in meeting this class of competition, except under special conditions. These special conditions do not generally apply to the small power user, but rather to joint gas and electricity undertakings where the cost of town gas can be debited at a specially low figure because there are no distribution charges to cover.




**New Model Crossley Gas Engine.**

On the other hand, when small and medium power only is required, then the modern town gas engine is well able to hold its own; and it should make a very much better showing than it apparently does at present. A small gas engine is a sound proposition to-day. The price of gas now charged by many undertakings is reduced to a figure that enables the town gas engine to compete easily against electricity at prices now charged for current in many districts.

#### Improvements.

When electric motors were first applied to the driving of small works and factories, the town gas engine did not possess many of the advantageous features since incorporated in its design. Imperfect tube ignition has been replaced by magneto ignition, and pump starting has been superseded by compressed air starting. There is never any lost time to-day in starting-up a town gas engine. The modern engine is fitted with variable admission governing gear, instead of the old-fashioned hit-and-miss system of regulation, and this has resulted in perfectly steady driving; while more perfect combustion has reduced the rate of gas consumption.

#### Electrical Competition.

It is realized only too well that many gas undertakings have experienced a definite falling-off in the number of consumers of town gas for power because electric motors have replaced gas engines. This is especially the case in districts where cheap electricity is available. In this connection it must be conceded that the electric motor offers a very convenient form of power, especially so for intermittent load working when the motor can be readily stopped for periods, and so save current. The electric motor is convenient also because it does not occupy much room, and generally speaking the attendance called for is small. But, notwithstanding all these advantages, electricity is by no means cheap to the small power user. The advantages are very often overstated, and many users would be well advised to reconsider their present case, taking into account the cheaper running costs now possible, and the advantages now obtainable from the modern town gas engine. Power users who may be contemplating changing over to electricity should review the present-day position most carefully before deciding.

In this connection, both foresight and enterprise are shown by Messrs. Crossley Brothers, Ltd., in developing a new type of town gas engine which embodies many distinctive features in its design which make this engine more suitable as a competitor with the electric motor. It also meets the market requirements for a high-grade engine at a low first cost. This firm have recently issued circulars briefly describing their modern town gas engines suitable for the small power user, and giving working costs in comparison with electric motors. It is shown that even with a small 6-H.P. town gas engine using gas at 2s. 6d. per 1000 c.ft. (say, 6d. per therm) the fuel costs with the gas engine are only half that of electricity at 1½d. per unit. Surely this offers sufficient inducement to the power user to instal a town gas engine in preference to an electric motor.

In dealing with the problem, Messrs. Crossley Brothers have embodied the following essential points which they consider are necessary for a modern town gas engine:

(1) An engine occupying little floor space.
(2) Perfect governing—variable admission or throttle.
(3) Magneto ignition—impulse type at starting, to ensure immediate starting-up from cold.
(4) Light moving parts. Improved continuous lubrication system.
(5) No noise, no vibration, and quiet exhaust.
(6) Economy in gas consumption.

The pamphlet referred to is issued to all gas undertakings for their general distribution. We are sure that gas managers throughout the United Kingdom will find the pamphlets very useful in pushing the claims of town gas for power purposes. There is a wide and largely uncultivated field in many districts which can be reached by suitable propaganda.

While on this subject, it may be well to consider, too, the possibilities in those industries where there is, in addition to the comparatively large demand for power, a demand for a small amount of electrical current in connection with the process or for the lighting of the premises. The case of the cinema industry was admirably dealt with by the "B.C.G.A." in a recent issue of "A Thousand-and-One Uses of Gas." In this case the current required for the projector—as generally—was

of a different nature from that supplied by the electricity undertaking. There was a choice between installing a converter of some kind and a gas engine driven dynamo; and it was not difficult to show that the town gas engine made a very good show.

It used to be contended that on the gas-works itself gas engines should be used for direct driving, to show customers how it could be done. There is no fault to find with the contention even now; but even on the gas-works, distribution of power by electrical means is found increasingly convenient, and even absolutely necessary in some instances. In those cases electricity can be generated in gas engine driven dynamos for less than 1d. per unit, charging the gas at 6d. per therm, and including all capital and running costs. And the gas engine driven set is generally necessary and advisable even when waste-heat recovery plant is installed, because the fluctuation in the demand for power on the works does not synchronize with that in the amount of waste-heat available, and because it is necessary to provide a stand-by for periods when boilers have to be cleaned and repaired.

# THE PRESSURE-DROP IN STRAIGHT SERVICE PIPES AND MAINS.

By A. GADD.

The present-day convenience and certainty attending the determination of loss of dynamic pressure in a main by means of suitable pressure-measuring instruments reduce the need of a formula for arriving at the desired result by calculation; but an understanding of the laws which govern the amount of such loss increases in importance with the development of the gas industry.

Many of the earlier formulæ relating to gas flow were based on false premises, or were unsatisfactory outside very limited conditions, for want of proper data or knowledge of physical facts. It was not realized in earlier times how differently a gas behaved when flowing below its critical velocity in a steady stream-like manner, and when flowing above that critical velocity in a disturbed or turbulent manner.

Another important and more recently investigated factor is the viscosity which a gas possesses. This internal friction, so to speak, being intimately connected with the molecular velocity of the gas concerned, cannot be associated, as it apparently has been in the past, with ordinary mechanical friction; and the problem is not lightened by the facts that the viscosity of the gas is independent of the pressure, and its coefficient, unlike that of a liquid, increases in value as the temperature rises. These truths may account for much disparity between practice and theory of past date, even making allowance for the imperfect condition of pipe bores.

Possibly the most scientific and up-to-date formulæ relating to gas flow were due, in the first instance, to the exhaustive investigations by the late Dr. T. E. Stanton jointly with Prof. J. R. Pannell, and, in the second instance, to the adaptation of the results of those investigators to the needs of the practical user by Dr. C. H. Lees. A modified form of the original equation by the last-named scientist probably interests the gas engineer most, as that form brings the loss of pressure directly into consideration. It is as follows:

$$\text{Drop of pressure} = \frac{2.\rho.l.v^2}{d}\left(0{\cdot}0018 + 0{\cdot}153\left(\frac{v.d.}{V}\right)^{-0{\cdot}35}\right)$$

where $\rho$ = actual density.
$l$ = length of pipe.
$v$ = mean velocity of the gas.
$d$ = diameter of pipe.
V = viscosity of the gas.

Unfortunately for British practice, the "drop" is expressed in dynes per sq. cm., and the other quantities according to the C.G.S. system. Also, the values of V for coal gas are probably not yet ascertained. V is affected by the size of the pipe (as well as by temperature), since the resistance due to V, per unit area, is equal to the product of the coefficient and the velocity-gradient, and the latter is inversely proportional to the radius of the pipe concerned. If, at the expense of accuracy, it were daringly assumed that an average value of V could be taken throughout the limited range of temperatures of the gas between storage in the holder and supply to the consumer, then the ratio $\frac{0{\cdot}153}{V^{-0{\cdot}35}}$ (attained by moving the position of $V^{-0{\cdot}35}$) could be taken to be approximately constant, although unknown.

In such case, by making $x$ represent the assumed constant named, the equation could be written:

$$\text{Drop} = \frac{2.\rho.l.v^2}{d}\left(0{\cdot}0018 + x\,(v.\,d.)^{-0{\cdot}35}\right)$$

Introducing Q (representing the quantity of gas passed through a pipe in unit time), and assuming the density of the gas remains constant during flow, then, with some little trouble, the equation can be brought to the form:

$$\text{Drop} = \frac{\rho.l}{d^5}\left(58.10^{-4}\,Q^2 + y\,(Q)^{1{\cdot}65}\right)$$

the constant $y$ being substituted for $x$, since the latter has become affected by the changes made.

It is obvious that if the "drop" were known for an average diameter of pipe, in relation to a given set of units as employed in the equation, then the value of $y$ would be ascertainable, and taken to be a workable mean value thereof.

A 1-in. pipe is by no means an average size, but, as illustrating the suggestion made above, if the general statement that $\frac{1}{10}$ in. of drop occurred in passing 100 c.ft. of gas per hour through a 1-in. pipe 100 ft. in length were taken as being sufficiently true upon which to base the formula, and (say) the average relative-density of the gas assumed equal to 0·42 (density of air assumed 1), then, by a tedious process of conversion of units named into those assumed in the equation, the value of $y$, to suit, would be capable of determination, and based on the data named. The equation in British units could then be expressed as:

Number of tenths in drop of pressure =

$$\frac{r.L}{D^5}\left(6.10^{-7}.\,Q^2 + 9.10^{-6}.\,Q^{1{\cdot}65}\right)$$

in which $r$ = relative density of the gas. L = length of pipe in feet. D = diameter of pipe in inches. Q = discharge in c.ft. per hour, and $9{\cdot}10^{-6}$ = value of the assumed constant $y$.

If this equation be solved for the values already mentioned, the required total drop comes out as 0·252 + 0·75 (using 4-figure logs. for determining $Q^{1{\cdot}65}$), or practically $\frac{1}{10}$ in.

Similarly, the constants could be altered to suit a really average size of pipe, were the conditions for the same as to "drop," in relation to the other units, known.

It is to be noted that $Q^{1{\cdot}65}$ is almost equal to $Q^{\frac{5}{3}}$, and the latter is equal to $(Q^2.Q^3)^{\frac{1}{3}}$ or to the cube root of the product of the square and the cube of the quantity Q.

But even with supposed known conditions for an average size of pipe, the altered or adapted equation would not be thoroughly satisfactory from the scientific point of view; and the real method to be adopted is to ascertain the value of what is the basis of the whole question—namely, the coefficient of viscosity for a normal make of coal gas, when the various values of V could be tabulated for various velocity-gradients and for various temperatures. In this way, the gap now existing between theory and practice in relation to gas flow and loss of pressure would be considerably narrowed.

The coefficient of viscosity apparently could be determined in the laboratory by the method adopted by Dr. Meyer with the use of long tubes, which gave results closely agreeing with previous experimental ones. By this method gas is passed through a long tube of uniform bore, and the inlet and outlet pressures are carefully measured, as well as the volume Q of the gas emerging in a given time $t$. The measured pressures are squared, and the *difference* of those squared pressures is here termed $D^2$.

If $r$ = the radius of the tube, $l$ = the length, and $p$ = the outlet pressure, then the coefficient of viscosity = $\frac{D^2.\pi.r^4.t}{16.l.p.Q}$ in C.G.S. units.

The whole of the above remarks refer to straight pipes or mains. The more complicated question of gas flowing round pipe bends is one which perhaps cannot yet be said to have been satisfactorily answered from the scientific standpoint.

## The Value of a Name.

A gentleman, with a name testifying to his nationality, was making a courtesy call in one of our overseas possessions. The concierge, evidently unable to grasp the name, was thereupon requested to announce him as "A gentleman from Halifax." On being shown into the sanctum sanctorum, he was greeted with the remark: "And so you come from Drakes' place." Halifax people will welcome the knowledge that their town is as well known overseas for its engineering products as for other commodities.

**Market Price of Gas Oil.**—In the market report of the "Petroleum Times" for the 5th inst., it is announced that, taking effect from the 28th ult., the price of gas oil has been reduced by ¼d. per gallon—making the current price 5d. per gallon, net and naked, *ex* wharf.

**Heating and Ventilating Engineers.**—Arrangements for the winter session, 1925-26, include some half-dozen meetings, and the annual dinner. The subjects to be dealt with by the authors are of a varied and highly practical character, and members should derive much benefit from the meetings, which will, in the majority of cases, take place at Caxton Hall, Westminster. Details may be obtained from the Secretary, Mr. W. G. Hollinworth, No. 38, Victoria Street, London, S.W.

# IRISH ASSOCIATION OF GAS MANAGERS.

## MEETING IN ULSTER HALL, BELFAST,

**Sept. 15 to Sept. 17.**

**President: J. D. SMITH, Esq., M.Inst.C.E., J.P.,**

**Engineer and Manager of the Belfast Corporation Gas-Works.**

## PRESIDENTIAL ADDRESS.

I very much appreciate the honour done to me in my election to the Presidency of the Irish Association. The position is one which carries with it the duty of surveying the condition of the gas industry in Ireland, and of expressing in an authoritative manner the opinion of the Irish gas industry on the questions which are under consideration in the country with regard to the utilization of fuel, the abatement of the smoke evil in our towns, and the provision of an adequate supply of light, heat, and power to our population. In my address to our Parent Society, the Institution of Gas Engineers, at the meeting in Belfast in June, 1923, I touched on most of these questions; and I hope I may be permitted to take up the threads, more or less, from where they were then left.

### SMOKE ABATEMENT.

Since that date a great deal has been written and said on all these subjects. The gas industry has no apologetic attitude to take up. Still less need it waste time on destructive criticism of other proposals for the solution of the problem of smoke abatement. Our attitude is that—to use the same words again—"the gas industry must claim the whole field of heating and cooking in the house, and should not rest until it solves the smoke problem, not by punitive legislation, with its attendant official intrusion which is so foreign to our national temperament and character, but by providing fuel in a form so cheap and convenient that it will pay to use no other."

### GAS.

The first duty of the engineer responsible for the management of a gas undertaking is to produce gas at the lowest possible price in view of the circumstances in which he is placed; or, in terms of the Gas Regulation Act, to produce the cheapest possible therm in view of the price which must be paid for coal and the return which can be obtained for residuals. The problem is no easy one. It is affected by capital, labour, and maintenance charges.

In a recent paper, Mr. Evetts showed what an extraordinarily complicated business it is to estimate the relative economies of the several processes which are available to the present-day gas engineer. One thing is certain—that we must by no means tie our hands to a fixed or standard calorific value. That would be to deprive ourselves of the whole freedom won by the passing of the Gas Regulation Act; we should put out of our reach one of the most important factors affecting the cost of gas.

On the other hand, there is a limit, though, no doubt, a changing one, below which a low calorific value does not necessarily mean a low cost per therm. Mr. Evetts' conclusion that "the cheapest coal gas to make is that giving the most therms per ton in normal circumstances" is open to considerable explanation and qualification. In Belfast we have always added to our straight coal gas more or less water gas, either carburetted water gas made in the usual way, or blue water gas generated by steaming in the vertical retorts. We send out gas at 460 B.Th.U., and we sell at 2s. 4d. per 1000 c.ft. for light, and 2s. for power and industrial purposes—figures which are equal to 6¼d. and 5¼d. per therm respectively.

We should paraphrase Mr. Evetts' dictum as follows:

> The cheapest gas to make under normal circumstances is got by making the maximum number of therms per ton at a calorific value which is readily saleable in your district, in plant of the lowest capital cost per therm produced, with the least labour and maintenance costs on the same basis.

### COKE.

Coke is our most important residual. No other residual has so marked an influence on the cost of gas. But the price of coke is subject to such violent fluctuations that it is, in my opinion, extremely unwise to give to this particular residual undue weight in decisions regarding the policy of gas manufacture. A short time ago coke commanded a price out of all proportion to its real value—that is to say, its value as a fuel. The calorific value of a pound of coke is always a little lower than that of a pound of coal. If the price obtained per ton of coke is a little more than the price which gas undertakings have to pay for coal, this advantage is only stable in so far as it represents the difference between purchasing one commodity wholesale and selling the other more or less retail. That is what constitutes "normal circumstances" as regards the relative cost and price of coal and coke. Once this is recognized, it will be seen that the duty of the gas engineer is to improve the retail trade in coke.

I may here pay a tribute to the public-spirited action of one of the great firms of contractors in offering handsome prizes for the best contribution to the solution of the problems surrounding the production, treatment, and sale of coke—the competition which was so ably conducted by Mr. Smith, of Birmingham, Mr. Leech, of Beckton, and Mr. Bezant, the Editor of the "GAS JOURNAL."

Most gas engineers, however, are alive to the urgent necessity for preparing coke for sale, clean, screened free from breeze, graded to suitable sizes, free from excessive moisture, packed in suitable bags, and so on. On the outside, a lot remains to be done in the devising and popularization of suitable fires and stoves in which coke can be consumed to advantage. Dr. Weyman and Prof. Boys, among others, are ready with designs for this purpose, especially in the shape of domestic fires. Dr. Weyman's "Newcastle" down-draught open coke fire is a particularly attractive design. It is based on principles and experiments described in a most original article which appeared in the Journal of the Society of Chemical Industry in January and February of this year, entitled "The Combustion of Coke in one Stage."

From the point of view of smoke abatement, the provision of domestic fireplaces, by means of which coke will become the popular fuel, is of immense importance. I was much amused some time ago on reading an article in a leading daily paper commenting very severely on the attitude of the gas industry in this country, and comparing it disadvantageously with conditions on the Continent, where towns are generally much freer from the smoke nuisance. The great industrial area round Dusseldorf was cited as an instance. The fact that in Germany and most Continental urban districts domestic heating is effected by coke burned in suitable stoves was evidently unknown to the writer. In my opinion, it is in this direction—that is to say, the provision of suitable fires and stoves for the domestic use of such coke as is readily produced and prepared by gas-works as at present constructed—that progress will be made, rather than by any drastic re-orientation of the gas industry on the production of some new type of solid residual.

### LOW-TEMPERATURE CARBONIZATION.

Attention may here be called to the position of the much advertised proposals to alter the whole process of our industry on the lines of low-temperature carbonization. We have to examine these proposals from more than one point of view.

The Fuel Research Board, after their offer to carry-out tests on plants for the low-temperature carbonization of coal had remained unaccepted for some considerable time, at last published the first and only authentic report on tests made on a plant of this description approaching the dimensions of full-scale working on a commercial scale—that is to say, a plant capable of carbonizing 50 tons of coal per day. The Director of Fuel Research disclaimed any attempt to appraise the commercial possibilities of the plant. It is necessary for us, however, to examine not only the technical, but the commercial aspect of low-temperature proposals. And we must, above all, be particularly careful to discriminate between *ex parte* statements, such as usually appear in the lay Press, and the actual facts, as represented by this, the first and only impartial report which has appeared on the operation of low-temperature apparatus on a working scale.

The report was critically examined in a leading article in the "GAS JOURNAL" for Oct. 29, 1924; which, no doubt, most of you read. No further time need be spent now in commenting on the methods of publicity adopted by the promoters of this particular variety of low-temperature carbonization plant. They are not likely to deceive gas engineers, though it is well to utter a warning that they may influence members of committees and boards of directors who are not technical men.

The technical results are best shown in the following table:

| Products Available for Sale per Ton of Coal Carbonized. | Low-Temperature Plant. | High-Temperature Plant. Belfast Annual Returns 1924. |
|---|---|---|
| Coal Carbonized | Dalton Main, Specially Selected with 4·7 P.Ct. of Ash. | Varying Mixture of Scotch and Cumberland Coals. |
| Coke or coalite | 12 cwt. | 10 cwt. |
| Gas | *Nil* | 15,600 c.ft. |
| Tar | 18·62 galls. | 12·6 galls. |
| Sulphate of ammonia | 13 55 lbs. | 30 lbs. |

The following points must also be noted:

(1) In the published statement of the yields obtained in the low-temperature plant, the whole of the products are given. There was, however, actually no gas available for sale; it was all used for heating the retorts, together with a further quantity generated from a portion of the residual coke.

(2) The yields of tar oils, motor spirit, and ammonia show no increase on results which are, or can be, obtained in every gas-works using the same quality of coal.

With regard to the production of motor spirit, which is sometimes the main argument in favour of low-temperature methods, it may be remarked that coal gas contains from 2 to 3½ gallons of 90's benzole, most of which could be readily recovered if and when prices justified it.

One gallon of benzole contains 1·56 therms, which is worth 9½d. in the form of Belfast gas. The cost of recovery by wash-oil is estimated by Dr. Davidson to be 7d. per gallon. The total cost of production, therefore, is 1s. 4½d., which, with benzole at 1s. 6d. per gallon, is not very attractive. A rise in the price of petrol, and the introduction of new methods of benzole recovery might alter this position very considerably.

(3) The labour cost is to be carefully considered. The actual number of men per day employed on the retorts and producers alone was 24, for the carbonization of 50 tons of coal. This is to be compared with three men for the same quantity of coal in a modern vertical retort installation.

(4) The particular coal carbonized in the test was carefully selected. Mitchell Main and Ellistown Main coals were rejected as unsuitable on account of the high caking quality of the Mitchell Main on the one hand, and of the low caking quality of the Ellistown Main on the other.

Less than 40 therms per ton was the gas yield. This may be taken as one-half the thermal yield of modern gas-works practice. So that, if our gas demand had to be satisfied by this method, it would mean that twice the quantity of coal—twice the plant—would have to be employed.

It has been suggested, however, that the low-temperature process could be modified to suit gas-works requirements. I have therefore set out what would be the effect of using a portion of the semi-coke for heating the retorts in the usual way, and of diluting the 700 B.Th.U. gas which is made by this process with sufficient blue water gas generated from another portion of the semi-coke, to reduce the calorific value of the gas to the 475-480 B.Th.U., which may be taken as the average of gas-works practice throughout the country. I have shown the results compared, on the one hand, with those which could be obtained with this beautiful, but very expensive, Dalton Main coal in vertical retorts, and, on the other hand, with the results actually obtained in Belfast.

*Comparative Results per Ton of Coal Carbonized.*

| — | Low Temperature. | High Temperature. | |
|---|---|---|---|
| | Barnsley. | Report of F.R.B. 1920-21. Second Section | Annual Returns, 1924. Belfast. |
| Coal | Dalton Main Hards. 4·7 P.Ct. of Ash. | Dalton Main. 6 P.Ct. of Ash. | Varying Mixture of Scotch and Cumberland Coals. |
| Coke made | 13·92 cwt. | 13·5 cwt. | .. |
| Coke consumed to heat retorts | 6 ,, | 3 ,, | .. |
| Coke converted to diluent gas | 2·7 ,, | .. | .. |
| Coke available for sale | 5·22 ,, | 10·5 cwt. | 10 cwt. |
| Gas at 475-480 B.Th.U. | 12,900 c.ft. | 19,000 c.ft. | 15,600 c.ft. |
| Tar | 18·62 galls. | 13 galls. | 12·6 galls. |
| Crude spirit | 1·78 ,, | Not recovered | Not recovered |
| Sulphate | 13·55 lbs. | 28 lbs. | 30 lbs. |

Left to itself, therefore, and to the free play of economic forces, there is little probability of low-temperature coke being placed on the market at prices which will compete with coal, gas coke, or gas. And there is not the slightest necessity that there should be such a possibility. Gas coke, and gas itself, can be used for the complete solution of the problem of smoke abatement, without any addition to the burden on the people of the cost of living.

## Cost of Heating Rooms.

There is a particular difficulty in estimating the cost of heating rooms by different fuels and different methods, because the personal equation enters so largely into the question. What is comfort to one individual would not be satisfactory to another. We should, therefore, welcome the paper recently issued by the Fuel Research Board (Technical Paper No. 12), in which this question is fully and exhaustively treated by Dr. Fishenden. Heating by convection and by radiation and by means of the hot-water radiator, the open coal and coke fire, the gas fire, and the electric radiator were conducted and compared one against the other in a standard room, leaving no doubt as to the value of the relative figures obtained. A little care, however, is needed in the interpretation of the figures, because certain assumptions are made on the cost of coal, coke, gas, and electricity which require to be corrected in the consideration of every particular case.

Dr. Fishenden has based her calculations on coal at 50s. per ton, coke at 45s. per ton, gas at 10d. per therm, and electricity at 1d. per unit. If we were to apply the results to Belfast, we should need to make the necessary corrections. We should base our calculation on coal at 52s. per ton, gas at 6d. per therm (assuming that we followed the example of the Electricity Department, and charged gas at the "power rate" for heating and cooking purposes), and electricity at 1½d. per unit.

The following table has been prepared from data given by Dr. Fishenden taking the case of a room of a capacity of 2000 c.ft. with three occupants, and comparing the maintenance of a comfortable temperature for 24 hours in the case of the hot water system with coke-fired central boiler with a maintenance of 16 hours, with fires of coal and gas and the electric radiator. The costs are given in pence per day.

| — | Dr. Fishenden's Figures. | Belfast Figures. |
|---|---|---|
| Coke (hot-water) | 2·4 | 2·4 |
| Coal fire | 6·9 | 7·2 |
| Gas fire | 16·2 | 9·9 |
| Electric heater | 34·0 | 51·0 |

It will thus be seen that in Belfast it will cost three times as much to maintain a given room at a given temperature with coal than with coke in a hot water system, four times as much with gas, and more than twenty times with electricity. The greater flexibility of both the gas fire and the electric radiator will, of course, tell in their favour; but while this will make gas as cheap as coal, electricity will still be too costly to be used in this way. The saving in labour and the gain in convenience are factors which have also to be considered.

## Power.

It is perhaps quite natural that Ireland should be intrigued by one or other of the grandiose schemes of electrical development which are engaging the interest of the world at the present time. Notwithstanding the crushing blow delivered to the electric super-power station proposals by the scathing criticisms of Sir Dugald Clerk and his collaborators in 1920, we are still assured that only by supplying light, heat, and power in the electrical form at the cheapest possible rates can coal be conserved and the country saved from ruin. The iniquitous suggestion that the electrical industry should be subsidized by the State has aroused opposition from our own industry which requires the full support of those interested.

Sir Dugald Clerk dealt specially with the contention, still often repeated, that the adoption of electricity for all purposes of lighting, heating and power would result in a saving of coal to the country. He showed that if all the coal now used in the gas-works to supply gas for heating and cooking—both domestic and industrial—were to be used for the generation of electricity for the same purpose, over four times as much coal would be consumed. He pointed out that the efficiency of power production and distribution by way of the gas-works and gas engines is 1·6 times that of the electricity system, and that lighting in the best modern practice is about equally efficient, whether by gas or by electricity. And he conclusively proved that the proposed super-power stations, in so far as they displace gas, will not save, but will waste, coal.

I make no apologies whatever for repeating these elementary facts. It is too evident that the public and members of our Government are a very long way from having digested them.

It is now generally conceded, however, that lighting and heating can be supplied by the gas-works far more cheaply and with far less expenditure of coal. The present cry is that cheap power is the one thing necessary to secure low costs of production in all industries.

Mr. Milne Watson, the Governor of the Gas Light and Coke Company, has recently examined this question, and dealt with it in two notable addresses. He has ascertained some very striking facts. Of these, the most important would appear to be that the cost of power to-day in Great Britain forms a very small proportion indeed of the total cost of production. "On the north-east coast," he says, "electricity for power purposes is as cheap as in Chicago, and twice as cheap as in Switzerland; and in any case it only represents something like 1½ p.ct. of the total manufacturing costs." He says, further, that he has ascertained that in a representative engineering works, power represents only 0·8 p.ct. of the total manufacturing costs; and he draws the inevitable conclusion that "it is clearly not high power costs which are the cause of trade depression. In fact, even if power were supplied for nothing, it is impossible to suggest that this could result in any appreciable improvement in the trade of the country."

It may be said, however, that Ireland is in a position different from Great Britain, and that the generation of electricity by the proposed Shannon barrage scheme, and the transmission of current throughout the country from this source of supply,

will solve all problems of cheap power and light supply. It will be said that Ireland is in a similar position to (say) Norway, where the supplies of coal are entirely imported, and where electricity can be generated by water power. What, then, do we find is the state of affairs in Norway?

We find, in the first place, that the capital cost of the necessary machinery and plant for generation and distribution is so high that local authorities are almost unanimous in advising against any extension of electricity schemes, because, they say, this development has been overdone, to the great disadvantage of the community. Not only has municipal debt increased out of all proportion to the services rendered, but the national debt has been heavily burdened by these schemes.

There are practical difficulties, too, in the way of the distribution of electricity over large areas. In a town where the current is generated by steam and distributed in underground cables, very little disturbance of the supply is experienced, and when current is distributed over the country by overhead wires, these are greatly liable to be damaged by thunderstorms and snow. In one centre which consumes more than 100 million units per year, interruptions to the supply have been very frequent—sometimes as many as 10 to 15 times per month, the period of interruption lasting from five minutes to several hours. In this town it has been found absolutely necessary to provide powerful gas lamps at the principal street corners. It has been estimated that if all lighting and heating in Norway were to be effected by electricity, the interest on the capital which would have to be provided would be twice as large as the amount required to purchase coal for the same purpose.

### The Gas Engine.

Where small units of power are required, the gas engine is admitted to be the most economical prime mover. Recently Capt. Riall Sankey again pointed out that small internal combustion engines are as economical as big ones; whereas, to get anything like a comparable heat efficiency with steam plant, very large units must be employed. No doubt where cheap supplies of electricity are available in urban districts, the electric motor is a convenient and cheap means of power supply; but there are numerous instances, particularly in the smaller towns, where the gas engine is applicable to power demands.

With electricity at 1½d. per unit, the cost per brake horse-power-hour is 1·25d.; at 1d., it is 0·83d. With gas at 2s. 6d. per 1000 c.ft. (a little more than the charge for power purposes in Belfast) the cost per brake horse-power in gas engines up to 25 B.P. is 0·63d., which falls to 0·57d. in a gas engine of 100 B.P.

The modern gas engine also compares very favourably with the electric motor. Improvements have been effected in most of the standard designs during the last five years which greatly reduce the floor space required. The governor has been much improved by the adoption of mixture governing giving an impulse every cycle, instead of the hit-and-miss governor which was the rule in all engines of moderate dimensions. The modern engine is easy to start, and runs at speeds, and with an absence of vibration, which are comparable with those of the electric motor. These are points which should be borne in mind when discussing power problems.

### The Gas-Fired Boiler.

Perhaps the most interesting development of the field of applicability of gas is that where small quantities of steam are required for manufacturing processes. In the boot and shoe industry it has been found that factories generally built in small towns and villages require only a few hundred pounds of steam per hour during the working day. Instead of building a boiler house with boiler setting and chimney, and with facilities for dealing with coal or coke and ashes, it is now only necessary to instal a gas-fired boiler which stands on pedestals on the floor, in any corner of the building, and requires no further attention than that of turning the gas supply on and off to meet the demand. The Kirke patent gas-fired boiler, with its thermostatic control valves, is now being rapidly adopted for demands of this kind; and it is fairly certain that the linen and other Irish trades would find it a cheap and useful appliance.

### Inspection of Fittings.

Once again I should draw attention to the necessity of gas undertakings attending to the condition of fittings in consumers' premises. Our scheme in Belfast is giving great satisfaction and excellent results. The fact that, in a period of continued trade depression, our returns show an increase of 120 million c.ft. of gas made over the previous year is demonstration of the efficacy of this method of ensuring the satisfaction of the consumer. But probably its chief value in the future will be the opportunity offered of showing consumers in detail the many widely different and additional ways in which gas and coke can be applied, to their business advantage and their personal comfort.

Continued increase in the consumption of gas is gratifying and encouraging; but it is probable that most of this increase is merely the natural expansion of the consumption of gas for heating and cooking, due to the logic of money saved by its adoption. Already, however, it cannot be denied that electric lighting, if dearer, is much more convenient than gas lighting. We shall lose the domestic lighting load unless we remove the stigma of inconvenience from the gas burner; and unless we look after the fittings, and see that these are kept at a high pitch of efficiency in all the premises which we supply.

The attention of manufacturers should be drawn to the necessity for devising gas lighting apparatus which can be ignited by means of a push-button or switch as conveniently as electric light, and which can be used in rooms without disfiguring walls or ceilings. When this apparatus is available, it will be our duty to maintain it, at a reasonable charge, in a satisfactory working condition.

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# TECHNICAL TRAINING WITHIN THE GAS INDUSTRY.

By Walter Hole.

**[A Paper read before the Irish Association of Gas Managers.]**

The question of technical education is of such vast importance to the industry that it is matter for congratulation that your Committee have given it a place in the programme of their annual meeting. When they did me the honour of asking me to come over and speak on the subject, I felt I had no option but to accept the invitation.

There is an impression in some quarters that this is purely a question for the juniors in the industry. No greater mistake could possibly be made. Whether considered from the point of view of administration, management, or staff preparation, it is the concern of all, as it touches all intimately. Practical problems in both gas manufacture and gas supply are growing more complex. Competition is becoming keener. We are increasingly realizing the necessity of using every endeavour to maintain and improve our position. The gas-works administrator has his large invested capital to conserve and make as productive as possible. He has onerous obligations to fulfil as a director of a public utility undertaking. To the administrator, therefore, highly trained and efficient counsel is a vital necessity. To the gas engineer, facing these problems in the daily routine of practical work, a well trained and practical staff, sufficiently educated to be able safely to vary accepted methods and arrangements by individual initiative and experiment, is no less important. And to the junior officer, looking forward to high and responsible office in due course, the severest training will not be too much if he is worthily to carry on in the future the work which his predecessors have so splendidly initiated and maintained. No one therefore can be in any doubt as to the importance of the subject. It is not a fad to be taken up or left at the whim of the individual, but a matter of life and death to the industry.

### The Education Scheme.

It is good, therefore, to know that the question is at last being grappled with in an earnest and strenuous manner. As a result of several years of close study of all the conditions—conditions which vary from those of every other great industry in the country—an educational scheme was evolved and accepted which has since been considerably strengthened by the insertion of those amendments that early experience has proved desirable and necessary. This scheme now includes provision for every important branch of the industry except salesmanship, which, at present, is only covered to the extent to which supply and utilization enter into its scope.

The scheme falls into three main divisions:

1. The training and certification of gasfitters.
2. The training and certification of those engaged in the industry who, not being gasfitters, and not being able or willing to take the professional course, still wish to undergo some less degree of technical training.
3. The training and certification of gas engineers.

In connection with the training and certification of gasfitters, it was not desirable either to overlook or supersede the splendid work which has been done in the past by the City and Guilds of London Institute. Attention was directed rather to the linking-up of this work with that of the Institution. The syllabuses and scope thereof have accordingly been revised by a Committee representative of the Institution of Gas Engineers, the Board of Education, and the City and Guilds of London Institute, and subsequently approved by the Advisory Committee. A scheme was thus evolved under which the City and Guilds of London Institute will continue their work in this subject. All those who attend these courses and pass the examinations will have their final certificate endorsed by the Institution of Gas Engineers. The course comprises elementary tuition in mathematics, drawing, and suitable

science subjects, as well as instruction in the principles and practice of gasfitting. It is divided into three grades, the courses for the first and second of which run for two years each, and the third for one year. Entrants to grade 1 course will, as a rule, be not less than 16 years of age.

With regard to the second of our main divisions, it is felt that there are many men engaged in the industry who for various reasons are unable or unwilling to qualify for professional status, but who are anxious to learn more of the processes on which they are engaged day by day in the ordinary routine of their duties. For these, minor grouped courses in gas-works practice and gas supply practice have been arranged, also in connection with the City and Guilds of London Institute. In fact, the gas engineering and gas supply examinations hitherto conducted by the City and Guilds of London Institute now become merged into the major scheme of the Institution of Gas Engineers, while the City and Guilds of London Institute undertake, in conjunction with the Institution of Gas Engineers and the Board of Education, responsibility for the minor grouped courses.

In these courses instruction will be given for not less than 100 hours a year for two years, covering, in addition to gas-works practice and gas supply practice, tuition of an elementary character in related science subjects such as mechanics, physics, and chemistry. All certificates gained at the end of the course will be endorsed by the Institution of Gas Engineers —a provision which will greatly add to their value.

The main portion of the education scheme, however—that by which its success or failure will ultimately be judged—is the third division, that dealing with the major courses for the professional student.

In arranging the major courses, the Committee have had to consider the existence and needs of two different classes of students. There are first of all those individuals so fortunately circumstanced by reason of residence in one of the larger centres of population as to be able to secure class instruction in gas engineering or supply, as well as in the science subjects ancillary to these. This is a class for which it is comparatively easy to provide. Then there are the less fortunate who live in the smaller towns. Here the number of students in gas subjects is necessarily much more restricted than in the large towns. Consequently the formation of classes in these subjects, not being an economical proposition, is not attempted. It is manifestly impossible, however, to exclude from the benefits of a scheme which has any pretence to be national in scope and character all those who form, in the aggregate, such a large proportion of the juniors of the industry. Provision has therefore been made to meet the requirements of these in the second section of the scheme.

Considering the provisions for the more fortunate students first, these are set out in Section I. of the scheme. In both gas engineering and supply the major courses are divided into three grades—the Ordinary, the Higher, and the Diploma.

### Ordinary Grade.

The Ordinary Grade provides for a course running over three years of not less than 150 hours per year. Recognizing the vast differences in local circumstances and conditions, the scheme very wisely refrains from laying down any hard and fast programme of ancillary science subjects, which should be common to the whole of the United Kingdom. It is obviously desirable to use for our purpose as many as possible of the classes already in existence. The subjects taught vary considerably in different localities in accordance with the trades of the district. The authorities of any technical institute desiring to add gas engineering or gas supply to their curriculum are therefore invited to submit a scheme through the Central Education Authority (in Ireland, either the Ministry of Education for Northern Ireland or the Department of Education for the Irish Free State) to the Advisory Committee. While, therefore, conforming to certain general principles clearly laid down in the regulations, this arrangement enables such an Institute to work into its scheme any suitable science classes which may already exist. In this way a general unity of aim, combined with diversity of means, has been secured. Such a local scheme, when it has received the approval of the Advisory Committee, becomes an approved scheme for the purposes of Section I.

The first two of the three years' course for the Ordinary Grade will usually be occupied with instruction in the ancillary science subjects, leaving the main subjects of gas engineering or supply to be taken in the third year. It is manifestly better to secure a knowledge of the scientific principles on which engineering and supply are based before proceeding to the application of them in any particular branch of the industry rather than after.

At the end of the third year, those who have satisfied the requirements as to attendance, homework, and laboratory work and have passed their examinations in each of the course subjects, are awarded a certificate by the Institution of Gas Engineers, endorsed by the Board of Education, and showing the subjects comprising the course which has been taken. The certificates are divided into three classes as follows: First class with distinction, first class, and second class, in accordance with the ability shown by the student.

### Higher Certificate.

The course for the Higher Certificate runs for two years, in which the student may either pursue further studies in those ancillary subjects which formed part of his course for the Ordinary Certificate, or, alternatively, in others, with the approval of the Advisory Committee. It is found in practice to be impossible to take both engineering and chemistry subjects together in either the Ordinary or the Higher Course. Consequently those students who take an Ordinary Grade Course with a bias towards chemistry are advised to take a Higher Grade Course in which a similar emphasis is laid on engineering subjects, and *vice versâ*. In this way a balance is secured between the two complementary sides of the students' training.

At the end of the second year an examination is held, and those who have satisfied the conditions as to attendance at class, homework, laboratory work, and drawing, and have passed the examination, are awarded a certificate, classed in the same way as in the Ordinary Grade, by the Institution of Gas Engineers, and endorsed by the Board of Education. The Higher Grade Certificate is restricted to those who are actually engaged in the practical business of either gas manufacture or supply.

### The Diploma.

The crown of the whole educational structure is obviously the Diploma. It is intended that this—the highest certification which the industry affords—shall be of a very high value indeed. It is a certification not only of academic attainment, but also of practical ability, and is therefore a prize worth striving for. To ensure that none but the right type of candidate shall pass the examination, certain restrictions have been inserted in the scheme. The candidate must be over a certain age, must have received a certain minimum general education, must have obtained a first-class in the Higher Grade in the same subject and the Ordinary Grade examination in the sister subject, and must produce evidence of professional experience satisfactory to the Advisory Committee. In addition to the written portion of the examination, he must also write an original thesis on some aspect or point of gas-works construction or gas manufacture if seeking a Diploma in gas engineering, or some aspect or point of gas distribution, supply, or utilization if seeking a Diploma in gas supply, and, finally, submit himself to a *vivâ voce* examination. The Diploma has been linked-up with the technical work of the universities in the provision that the possessor of an approved degree in gas engineering of a British university is exempt from the written portion of the examination. It is fairly obvious that none but the highest and best type of candidate will be able to negotiate all these hurdles, and, therefore, that the industry may safely regard the possession of the Diploma as a certification of the very highest order. An additional value has recently been given to the Diploma in that the possessor is now entitled to apply to the Council of the Institution of Gas Engineers for admission to full membership.

Having now traced the operation of the scheme from the commencement of the course for the Ordinary Certificate to the crown and summit of all in the Diploma certification, in the case of those who are able to obtain tuition in gas subjects at an approved technical school, we must now retrace our steps to consider how the scheme has been adapted to the case of those not so fortunately placed. These are at present in the majority. It is hoped that as time goes on, and the value of the scheme becomes more widely appreciated, an approved technical institute giving instruction in gas subjects will be within the reach of all but those living in the most sparsely inhabited parts of the country. At present there are only 24 such institutes—a number which must be enormously increased if the needs of the industry are to be adequately met. In the meantime, provision has had to be made for those who are without these advantages. Obviously there could be no lowering of standard even to meet hard cases, as this would go far to destroy the value of the scheme as a whole. The way in which the needs of this large number of students has been met without sacrificing the value of the certificates in any way is set out in Section II. of the scheme.

### Ancillary Subjects.

Though tuition in gas subjects is given in few institutions at present, there is, fortunately, a technical institute established in most, if not all, towns of any considerable size throughout the country. A list of those in the Irish Free State is given in Appendix I.; and a list of those in Northern Ireland is given in Appendix II. In these, tuition may be obtained in the science subjects ancillary to gas engineering or supply. Under Section II., therefore, students are required to avail themselves of these to the fullest extent. It has already been pointed out that the subjects taught in different centres vary in accordance with local conditions. The Committee have therefore given as wide a choice as possible by compiling a list of seven ancillary science subjects, and require that a candidate for the Ordinary Grade examination shall have studied, and profited by the study of, any three of these, up to the standard of the third year of the senior course of an approved technical institute. For his study of gas engineering or supply, the student has to depend upon private reading and such coaching as he may be able to secure, combined with the practical day-by-day work in his

profession. It is conceded that no amount of private study can ever be an efficient substitute for personal contact with a real live teacher who knows his subject; but at present these substitutes are the best within the reach of a very large number of the members of our junior staffs. On the other hand, it must be recognized that, being engaged in the practical work of the industry, they are enabled to relate their studies to actual conditions in a way which is obviously impossible in connection with many other subjects. The disadvantages inherent in the position are therefore neutralized to a considerable extent.

By way of recapitulation, therefore, I may say that any student who thinks himself entitled, under these conditions, to sit for examination under Section II. of the scheme may apply for an application form. In filling this in, the candidate must state what ancillary subjects he has taken, and to what standard, and supply certificates or vouchers in support of his application. He must also supply a voucher from his chief, testifying that he is engaged on the practical side of either gas engineering or supply. If the particulars prove satisfactory, the candidate is accepted, and arrangements are made as far as possible for the examination to be held in his own town or at a near centre. The examination so held is of equal standard with the similar one in Section I.; the only difference between the two being that the certificates gained in this Section are not endorsed by the Board of Education.

Similarly with regard to the Higher Grade examination. When the possessor of an Ordinary Grade Certificate is in a position to satisfy the Committee that he has received, and profited by, further instruction in the ancillary subjects taken for the Ordinary Certificate, or, alternatively, in other subjects approved by the Advisory Committee, to the required standard, he may be admitted to the examination for the Higher Certificate. In this grade, again, the examination is of equal standard; indeed, the paper set and the time of the examination are exactly the same as in the similar Grade under Section I. The only difference is that here again the certificate is not endorsed by the Board of Education. It does, however, show the sciences which have been taken as ancillary to the principal subject of examination.

The Diploma examination is as open to all Section II. students who are able to satisfy the conditions as it is to those who approach it by way of Section I. The path, therefore, from the elementary stages to the highest certification is as accessible to the man of character and ability, who has the grit to face and overcome the difficulties inherent in the position of the external student, as it is to the most fortunately circumstanced of those who are able to avail themselves of the advantages of Section I.

### Principles of the Scheme.

It will have been observed that there are certain important general principles running through the scheme, which may now be more particularly indicated.

1. The scheme is as all-embracing as the nature of the case permits.
2. The scheme aims at thorough education and training, with certification following only on the primary aim being achieved.
3. It secures such education and training in the most effective manner possible by means of course study.

With regard to the first point, it has been shown that the education scheme covers all ranks and nearly all circumstances within the industry. It takes the youth coming into the industry as a gasfitting apprentice, and provides for him a course of instruction in the theory and practice of his craft, and final certification. The importance of such technical and simple science training to the gasfitter, and through him to the welfare of the industry, cannot be overestimated. The fitter is the representative of the management who comes more often and more intimately than any other into touch with the consumer. The more highly-trained and efficient he is, the more satisfactorily will he be able to deal with the complaints and needs of those customers. The more this is done, the more will he commend the service of his undertaking. And after all, a highly satisfied customer is the best advertisement any public utility company could possibly desire.

### Minor Grouped Courses.

Passing forward to the class of works foremen, skilled mechanics, district inspectors, the more intelligent of the higher ranks of workmen, and certain departments of our clerical staffs, these are admirably provided for in the minor grouped courses. The man who desires to know the why and the wherefore of the duties he performs each day, and whose desire takes him the length of sacrificing time and means in the determination to learn, is a very great asset to his employer. Higher intelligence spells greater efficiency, and greater efficiency in all ranks is what we are endeavouring to achieve.

Moving on to the class who wish to prepare themselves for the higher positions in the industry, we have seen in detail how, along two distinct lines, the scheme opens-up to the youth leaving school an educational ladder by which he may climb to the highest positions. He will have to be prepared for sacrifice of time and means. He will have to undergo severe mental exertion and self-discipline. There is no royal road to success. The man who wants the prize must be prepared for the dust and the toil. But given the ability, grit, and determination, the scheme points the way to, and offers the opportunity for, advancement to all who are willing to pay the price.

This willingness surely imposes a moral obligation on the employer, even though the material advantages are so obscured or remote as to go unrecognized. That obligation is to aid and encourage such deserving and capable students to the fullest possible extent. This is being done at many centres now by allowing daytime facilities for attendance at classes, the payment of class fees on a basis of regular attendance or class results, the recognition of signal success by increases of wages or salary, and many other similar ways. No investment can offer such a sure and high rate of interest as that which is made in the young manhood of the industry.

Secondly, the scheme aims at education first and foremost. Certification is made subordinate to training. It plans to secure a well-trained student. It encourages true education and discourages cramming. There is no place in the scheme for the man who simply wants to "swot up" a certain minimum amount of reading, with the idea of getting through an examination. Such a man is of little use either to himself or to the industry. What knowledge he acquires in this way is like seed sown in shallow or stony ground. It may take root, it may even give the appearance of approaching fruition. But the hot sun plays havoc with it. So with such a student. He is shallow and superficial. He can never be a success. As soon as the hot sun of an oral examination beats upon him, with its keen and searching questions as to dealing with practical work-a-day emergencies and problems, and those other intimate matters which cannot be read-up from books, put by masters of their craft, as soon as such a sun beats upon such a tender seedling it shrivels and withers away. And one is inclined to say that the disaster has been well merited. The certification of the ill-trained and half-baked student is bad for both the individual and the industry. Certification following proper and adequate training is good; and this it is which the scheme aims to give.

The third principle is that of course study. The student must take those sciences on which gas engineering or supply is based. He must take these in a proper sequence. He must take them in a correct correspondence. The result is that all along the way he is able to correlate them with each other. He finds in each the complement and illustration of the other. Having a correlated science foundation well and truly laid, he finds the main subject of study made comparatively easy. Otherwise difficult problems are solved in the wider knowledge. The well-arranged and suitably co-ordinated scheme of study results in the well-balanced, thoroughly grounded, and satisfactory student the industry requires.

To sum all up, if the education scheme is to prove the success we all hope for, it must be by a great co-operative effort. The administrator must afford facilities and offer suitable assistance and rewards to earnest and promising students. The manager must seek by kindly interest and acknowledgment to encourage the promising talent in his department. And the student must not look for a bed of roses. Rather, it will be a hard rough road for him. But if he is prepared to "put his back into it," to give time, thought, and means, to bring energy, grit, and determination to his work, there can be little doubt that sooner or later, possibly in ways entirely unforeseen, these qualities, and their results in his studies and work, will secure for him the recognition and advancement he desires.

## APPENDIX I.

List of Technical Schools in the Irish Free State in which Subjects Ancillary to the Study of Gas Engineering are Taught.

| School. | Name and Address of the Principal Executive Officer. |
|---|---|
| Dublin . . . | Mr. L. E. O'Carroll, B.A., B.L., No. 18, Parnell Square. |
| Cork . . . | Mr. F. B. Giltinan, Crawford Municipal Technical Institute, Sharman-Crawford Street. |
| Limerick . . | Mr. P. V. Twomey, Municipal Technical Institute. |
| Waterford . | Mr. J. F. Lane, B.A., Central Technical Institute. |
| Cobh . . . | Mr. A. H. Moynihan, B.A., A.R.C.Sc.I., Technical School. |
| Pembroke . | Mr. J. G. Mathews, Town Hall, Ballsbridge, Dublin. |
| Tralee . . . | Mr. D. D. O'Sullivan, Central Technical School. |
| Clonmel . . | Mr. P. J. Reilly, Central Technical Institute. |
| Sligo . . . | The Acting Secretary, Municipal Technical School. |
| Kilkenny . . | Mr. G. T. Phillips, City Technical School. |
| Dundalk . . | Mr. W. J. C. Davis, Municipal Technical School. |

## APPENDIX II.

List of Technical Schools in Northern Ireland which provide

Instruction in Subjects Ancillary to Gas Engineering and Supply.

| School. | Name and Address of the Principal Executive Officer. |
|---|---|
| Ballymena | Mr. P. F. Gillies, B.Sc., Municipal Technical School. |
| Ballymoney | Mr. J. Pettigrew, B.A., B.Sc., Technical School. |
| Banbridge | Mr. O. S. Spokes, Municipal Technical School. |
| Belfast | Mr. J. Earls, B.A., Municipal College of Technology. |
| Carrickfergus | Mr. C. A. Binnie, Technical School. |
| Coleraine | Mr. W. R. Johnston, Technical School. |
| Holywood | Mr. W. Mitchel, M.A., B.Sc., Technical School. |
| Larne | Mr. T. Clearkin (Secretary), Technical School. |
| Lisburn | Mr. C. Webb, Municipal Technical School. |
| Londonderry | Mr. C. E. Armstrong, M.Sc., Municipal Technical School. |
| Lurgan | Mr. H. O. Armstrong, Municipal Technical School. |
| Newry | Mr. T. J. Flynn, Municipal Technical School. |
| Newtownards | Mr. P. A. Cole, Municipal Technical School. |
| Portadown | Mr. W. B. Jamison, Municipal Technical School. |

# GAS CHARGES AND INDUSTRIAL GAS.

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**[A Lecture Delivered before the Irish Association of Gas Managers.]**

In the economics of gas production, the question of the applications to which gas is put has too little attention. One of the great advantages gas undertakings have over electric supply undertakings is that gas can be stored in holders, and gas can consequently be worked within certain limits independently of the hour-to-hour demand. There can be no practical bulk storage of electricity. Nevertheless, this advantage does not completely solve the difficulties due to the wide variations between day loads and night loads, mid-week loads and Sunday loads, normal loads and holiday loads, winter loads and summer loads. In general there is an advantage in the summer load being much less than the winter load, as this gives the engineer the opportunity of carrying through his repairs when the load is the lightest.

In recent times the difference between winter and summer loads has not been so marked, owing to the increase in the use of gas for other than lighting purposes. The ideal and most economic consumption that the gas engineer has is that which is regular for the whole 24 hours, 7 days to the week, and 365 days to the year; and the nearer that individual gas consumption can approximate to such ideal conditions in the bulk of the output, the cheaper should the cost of production and distribution be. It also goes without saying that, generally speaking, the larger and the more constant the consumption, the lower will be the cost of that supply to the gas undertaking.

## DIFFERENTIAL RATES OF CHARGE.

During recent months a demand has been made that a competent committee of experts should give the very fullest consideration to the question of differential rates for various types of consumption. It is to be hoped that this matter will not be left where it is, as there would appear to be no doubt that the whole gas industry is waiting for a lead in this connection. It is now accepted that the industrial load is an excellent one to acquire. The question will probably be asked, "What is meant by the industrial load?" I would define it as being that load which is other than purely domestic. It would include gas used in restaurants and fish shops, as well as that used metallurgically or in direct connection with industry. If gas alone were used domestically for lighting, cooking, and heating, the order of the value of consumption, both as regards quantity and distribution over the day, would be—heating, cooking, and lighting.

One of the chief difficulties in making any radical differentiation between the charges for gas will be that, even when the gas manager is satisfied that considerable differentiation should be made in special cases, gas committees and boards will be more difficult to convince. The committee member, the votes for whose election depend largely on his reputation, rightly or wrongly acquired, for fighting for the "bottom dog" and the oppressed, cannot usually see that it is conceivable that there may be ample justification in many circumstances for giving very reduced rates to particular types of consumption.

The gas industry is not different in many respects from normal industrial actions and reactions. In the case of very large possible consumptions, the gas engineer should be free to consider *de novo* the whole situation, and to say to himself, "What will it cost me over and above my present charges to supply this consumption, and what guarantees shall I require from the prospective consumer in order to maintain continuity of advantage?" All these matters should receive the careful consideration of any committee who are to deal with this subject.

One hears of works in which the plant available is 25 p.ct. greater than would be required during the period of maximum output; and when the manager is asked for his price for a guaranteed annual consumption of 100,000,000 c.ft., he quotes a small rebate from the average cost of production of gas in his undertaking, when it is obvious that such average cost includes all standing charges on works, together with the disused plant, gasholders, offices, distributory system, &c. If he had got down to the actual increased cost that would be entailed over and above his present costs in the production of the extra gas, he would have found that he would have been able to sell his extra gas with profit at a figure which was very considerably less than would have been sufficient to have obtained the increased consumption if standing charges had to be taken into consideration. In fact, there is no doubt there are many cases in which the actual cost to the ordinary consumer would have been reduced through the acceptance of the increased consumption at a price much below that which the management considered economic.

It has already been pointed out that capital expenditure, which should include everything in connection with the gas undertaking, is a large item in the cost of production; and if the plant—not only the carbonizing plant, but all other plant—as well as staff, are not being used to their maximum capacity, then costs are likely to be higher than they should be. There are many industrial concerns, not only in this country, but more particularly in other countries, which have found that the cost of production of their commodities can be reduced very largely by arranging for plant and equipment—in fact, all capital expenditure—to be used as far as possible 24 hours to the day, instead of during the normal day shift. This is largely the explanation of dumping. The goods that are dumped in this country are frequently the goods that are made, in effect, during the night shift; and they are sold at prices corresponding to the extra cost of production entailed by running the night shift, excluding standing charges, which are borne by the other two shifts in the day, and there would be profit on such costs as well.

I think I have said sufficient to convince you that the whole question of gas charges requires revision. I have only touched on one or two of the many directions in which inquiry should be made. We need to know, for instance, whether a minimum service charge is justifiable; and other matters require looking into. The industrial load is available for us, at a price. The market is open. The dumper has to find his markets. Cannot we dump our gas in industrial enterprise?

## ENCOURAGE EFFICIENT APPLICATION TO INDUSTRY.

Leaving that part of the subject, I want to say something now on another matter of almost equal importance. The only deciding factor of any moment, as to whether the gas industry shall be practically the sole purveyor of energy to industry, is that of price. There are two aspects as regards price. There is the actual cost of energy passed through the meter, and there are the requirements of the amount of energy needed in industrial processes. The industrialist is not at all interested, paradoxical as it may sound, in the price of energy as such. He is solely interested in the bearing the cost of energy has on his total cost of production. It is well known that, gas being more convenient, more cleanly, comfortable, and hygienic, there are many savings to be made by its utilization other than the direct saving attributable to fuel cost alone. We should not, however, be satisfied with this. Every encouragement should

be given to the development of more efficient applications of gas to industrial purposes. There is altogether too much standardization of equipment; and manufacturers are too frequently asked to adapt their processes to furnaces, whereas the furnaces should be adapted to the requirements of the process. I know it will be argued that such a policy would inevitably increase the first cost of installation; but my reply would be that such a policy would enable gas to be used in many places where it can now not be considered, and, owing to the demonstrated increased advantage of gas, it would be more readily used where conviction had already been brought about.

The industrial field is one quite distinct from the domestic and lighting field. It requires a different mentality, a different experience, a different training, and a different type of man. In most cases it is not practicable for individual gas undertakings to carry such men; and where the undertakings are big enough, or the demand for industrial gas important enough to justify such a staff, it is impossible to obtain real satisfaction for the consumer or the gas undertaking if such men are taken from among lamplighters, meter inspectors, or more or less elderly clerks. A thorough fundamental training and experience of a general and particularized nature are absolutely essential. The primary knowledge should be in combustion, but it is extremely important that the industrial gas sales engineer should be one who has had an engineering training and experience in general industrial processes.

### Industrial Gas Sections.

A number of the larger gas companies have important industrial gas sections. Some of them are staffed by such men as I have indicated; but in some cases the policy adopted by such staffs is narrow, parochial, inexperienced, egotistical, and not conducive to the progress of their industrial section to the extent to which it might be if they had had a large experience. A cumulative knowledge and experience from the whole of the British gas industry in connection with the multitudinous applications of gas to industry should be available for all gas undertakings, if properly organized. No one undertaking can develop an experience within itself that is as good as this cumulative experience.

If I were in charge of an industrial gas section of a large undertaking, I should make it my business to know as much as possible of what other people are doing, and pick out the best that is available, and apply it in my own district. At the same time, in cases where new equipment had to be devised, it would be necessary for me to do the best I could with the experience and knowledge that I might have acquired, either from my own work or from my association with other competent men. It would not matter one bit whether the particular equipment that I might finally recommend in a particular instance was known as my equipment or anyone else's. To me it would be gas industry equipment of the best that I knew; and if I were directly obligated to any particular individual or firm for ideas or suggestions, I might even exaggerate on all suitable and proper occasions the service which I, and the gas industry, had been rendered by such individuals. In this way only should I feel that those individuals would be prepared to help me again; and I should have a completely free conscience that I had not only done my best for the gas industry, but that I had not appropriated kudos in what might be thought, rightly or wrongly, an unfair way.

In all probability the defect, if it exists, is due to the fact that some chiefs in gas undertakings, subsidiary or otherwise, adopt a harmful way of assessing the merits of their industrial sales engineers. One of the results which accrue from such actions of inexperienced engineers is that there is practically no co-ordination between furnace makers and most gas undertakings. One has come across many instances in which gas undertakings actually compete with furnace makers in putting forward plant and equipment required by their consumers. I know of one case where this went on for a period of over three years. The consumers would go to the gas company and ask for advice. This advice was almost invariably against the equipment of the furnace maker, in spite of the fact that their consumers' competitors in the same trade were using with great success the very equipment that the gas company refused to recommend; and in the end, after some scores of such equipment had been installed, the gas company themselves partially adopted the principle of such equipment, and again went into competition with the furnace maker for its supply. Unfortunately, in this particular case, the consumer has been the only one to be inconvenienced or confused, as the futile efforts of the gas company have not affected in any serious degree the universal application of gas in this particular industry.

The experience I have indicated to you must not be taken as either that of one gas undertaking or one furnace maker only. So far as the furnace makers are concerned—and there are not many of them—the experience is nearly general. I do not see how such difficulties can be altogether eradicated, unless the industry as a whole undertakes the training of industrial sales engineers, and develops the industrial sales side for the whole industry. The advertising can be well done by the British Commercial Gas Association, but the technical advice, recommendations, and operations, would have to be undertaken by a new body. I believe it is worth doing, and if really competent men could be made available on the application of any gas undertaking, a very remunerative service would have been rendered to the industry as a whole.

### Infinite Possibilities of Industrial Applications.

Earlier in my remarks I omitted to mention, when speaking of the cost of gas, the question of efficiencies. I stated that the prime interests of industrialists are the bearing which the cost of gas has on his total cost of production of the commodity he is selling. If by the adoption of new or improved methods of burning gas the consumption for a given operation can be reduced to one-half, from the industrialist's point of view this is equivalent to reducing the price of gas by one-half, and the improved results obtained will have the effect of making gas so much more popular that the consumption lost by the gas undertaking in the one instance will be much more than gained by increased application, either in that or other industries.

It is not my objective in this talk to give you a technical dissertation on the various methods of burning gas; but I can tell you that there are many working on this subject; that great advances have been made in recent years; and that from the known research work and development work that is going on, not by one individual or association of individuals alone, but by many, the possibilities of improved equipment and improved methods of burning gas in the future are likely to have as great a bearing on gas consumption for industrial purposes as the Welsbach mantle had in connection with lighting. As an instance, four years ago relatively there was very little gas used in the printing trade in London. New methods were put before the printing organizations about three years ago, and at the present time there are some hundreds of furnaces in the printing trade entirely on gas, and coke and coal are practically unheard of. The equipment supplied by one furnace maker alone is responsible for an increased consumption of over 100,000,000 c.ft. a year; and this is only one application. One of the firms had previously used gas, and the manager has stated that the new equipment requires a consumption of one-third the amount of gas that he previously consumed with his old-fashioned gas appliances, and the speed of operation has been greatly increased.

There are almost infinite possibilities in the number of applications of gas to industrial purposes. The advantages of town gas over solid fuels, if the cost is right, are so enormous that industrialists are already quite convinced believers in its use. In making a comparison between various fuels, cost alone is not the only consideration. Apart from what I have already said, there is also the inherent value of gas as a means of obtaining high flame temperatures.

I came across a proposition the other day in which the people concerned had to choose between producer gas and town gas. The consultant who was advising them had said to himself, "Can producer gas be made to carry out this operation?" He had satisfied himself that it could, and had then compared the two alternatives—namely, town gas and producer gas—on a straight thermal basis, and had concluded that, because producer gas could be made for 4d. a therm, he would not be justified in recommending town gas unless it could be purchased at the same figure. Now the particular proposition he had to deal with was one of high outputs, where temperatures of the order of 600° C. were required; and he concluded that, because such temperatures could easily be obtained with producer gas, and because the equipment for burning the gas would be identical in arrangement and principle with that required for town gas, it was merely a matter of cost of heat units.

It turned out, owing to the fact that the possible flame temperature obtainable from coal gas was considerably higher than that obtainable from producer gas, the efficiency of heat transmission was much higher when consuming coal gas than when using producer gas. Most furnace work depends on radiation—or should do so. Radiation depends on flame temperature. The higher the temperature of the radiating body, the greater will be the rate of heat transmission. In this particular case, it was shown that the increased efficiency obtainable through these means by using coal gas was such as to justify an increased expenditure per therm of 25 p.ct. over the cost of producer gas. There was the added advantage that there was no necessity for the consumer to put in his own gas-making plant, with heavy standing charges when the plant was not working, and irregularities in gas composition when working on light load.

The gas industry must be adaptable. It must not act as if it were a civil servant, restricted by red tape, and treat the consumer on the "take-it-or-leave-it" principle. It should enthusiastically constitute itself the servant of the public, endeavouring in all proper ways to adapt itself to the public requirements, be flexible in its arrangements, and shoulder the responsibility of being the one reliable source of fuel for domestic and industrial purposes. This can be done. It requires initiative, imagination, and untiring energy. It will take a long time if it depends on individual action; it will come very quickly by combination.

Dr. Smith then showed a number of lantern slides of industrial furnaces, and described the advantages of gaseous firing in various industries.

# THE "PERMUTIT" PROCESS OF SOFTENING WATER FOR USE IN WASTE-HEAT BOILERS.

By Captain E. BROOKE-PIKE.

**[Extracts from a Paper read before the Irish Association of Gas Managers.]**

In my paper I am dealing with some practical aspects of the question as it affects the gas engineer who is thinking of putting down a water gas waste-heat boiler. Water, the most powerful solvent there is, contains, as we get it from our various sources of supply, certain constantly changing mineral substances which have proved a serious source of economic loss to the steam user.

Chalk, or carbonate of lime, which is the predominating constituent of nearly all naturally hard waters, and certainly of all hard waters in this island, is dissolved, not by water of its own solvent power, but by water which contains carbon dioxide gas, and which is virtually therefore a weak acid—carbonic acid. By boiling this gas out of the water—a tedious and expensive process—or by adding quicklime, which absorbs carbonic acid, the greater part of the hardness due to carbonate of lime can be eliminated. But it must not be forgotten that water is capable, by its own solvent power, of dissolving many other substances which cause hardness, prominent among which are sulphate of lime, or gypsum, nitrate and chloride of lime, and carbonate, sulphate, nitrate, and chloride of magnesium.

*Carbonate of Lime,* which is chemically identical with marble and chalk, is the substance which usually forms the great part of the hardness of ordinary waters. It is sparingly soluble in pure water, freely soluble in water containing carbonic acid. On removing this gas, either by heat or by adding lime to the water, carbonate of lime is thrown down as a finely divided white precipitate. Carbonate of magnesia is very similar, except that it is somewhat more soluble in pure water than is carbonate of lime.

*Sulphate of Lime, or Gypsum,* is the next widely occurring constituent of water hardness. It forms a very hard flint-like scale when evaporated in boilers, which possesses forty-eight times the heat-resisting qualities of steel.

*Magnesium Chloride* is a dangerous salt to have in a boiler feed water, because it decomposes in the presence of steam, at the temperature and pressure of the boiler, into free hydrochloric acid and magnesia. The hydrochloric acid attacks the iron of the boiler, and serious weakening is the result. The iron salt formed is, in its turn, decomposed by steam and oxygen, and hydrochloric acid is re-formed, so that a vicious cycle of corrosion is set up.

The old and well-tried method of water softening which held the field alone from the time of the introduction of water softening plants up to the time of the introduction of the "Permutit" process was the system of softening with lime and soda; these cheap and easily obtained chemicals being used to precipitate the hardness-forming salts in the water, and the precipitate so formed being settled in tanks and filtered off. As a result, the hardness of the water drops from 16° or 20° or 25°, or whatever it may be, to 3°, 5°, 7°, or 10°, according to the efficiency of the particular make of softener employed.

The disadvantages of the lime-soda process are the relatively large space required for the reaction and settling tank, the continual readjustment necessary, the need for constant testing, the great dependence on the human factor, and the formation of a large quantity of solid sludge which has to be disposed of, to which must be added the labour involved in cleaning and changing filters, although the latter is minimized in some types of plant by the provision of automatic filter-cleaning gear.

The "Permutit" zero-hardness process softens water completely in an entirely different way from that employed in the lime process. "Permutit" softens water instantly, by mere contact, no precipitate being produced. It does this by substituting the sodium which it contains for the calcium and magnesium in the water. All that is necessary with this system is a suitable bed of permutit material, with arrangements for allowing the water to flow through it at a prescribed rate. When the softening capacity of the bed is exhausted, the permutit material can be completely regenerated by passing through it a solution of common salt (sodium chloride), and made ready to soften a further quantity of water. The "Permutit" plant consists simply of a cylindrical tank containing a bed of permutit. Connected with this tank is a small one in which is prepared the salt solution for regeneration. The control of the plant is easy, and can be carried out by unskilled labour. The attention required varies from 20 to 40 minutes per day, according to the size of the installation. The mineral compound which has this extraordinary power of softening water without itself becoming dissolved or changing externally in any way is one of a family of chemical substances termed zeolites.

In the year 1912 the manufacture was commenced in England by Water Softeners, Ltd., of artificial permutit, in the manufacture of which precipitation by reaction between solutions took the place of fusion of the dry ingredients. The result was a permutit of greater exchange activity than the original product. This variety of permutit remained in use for five or six years, during which time its capacities and limitations were very definitely ascertained by practical experience in the working of larger plants. Contrary to the ideas which had been hitherto entertained, it was found that the artificial material, although possessing an initially greater capacity of exchanging or softening power, was distinctly inferior to the natural permutits in point of hardihood and durability, susceptibility to carbonic acid, and the liability to dissolve away. This directed attention back to the naturally found material; and after two years' investigation and experiment, the firm of United Water Softeners, Ltd., perfected and put on the market a natural variety of permutit which had been rendered suitable for universal use by special intensifying and stabilizing processes. This natural material possesses great hardiness and stability, coupled with intense activity of exchange power and capacity for extremely rapid regeneration, and is a great advance on any zeolitic material hitherto used. Both in this country and in America it is rapidly superseding the artificial product.

One of the greatest advantages of this natural permutit is the durability of the product itself, since this governs the all-important question of depreciation of capital outlay. There is now no dispute that all artificial zeolites are rapidly deteriorated by the free carbonic acid in the water under treatment. And there is always a further risk, if the water supply contains iron in solution, of precipitation of the iron within the porous structure of the grains of the base-exchange material, which thereby in time becomes choked with iron oxide, after which the exchange activity of the artificial material gradually diminishes to a very low point, or altogether. With the natural permutit, on the other hand, complete immunity exists from any destructive action of free $CO_2$ in the water. In fact, natural permutit can itself be put into weak sulphuric or hydrochloric acid without the slightest fear of damage; and this latter fact furnishes an easy means for cleansing the material from any iron or other deposit which may after many years of continuous running accumulate in it.

Another most valuable asset of the natural permutit is a greater degree of softening power than has been possessed by any previous zeolitic material. This is shown by the fact that water of any hardness can be reduced by filtration through natural permutit to a total content of lime and magnesia not exceeding 0·25 part per 100,000 or 0·17 grain per gallon—an achievement absolutely impossible in commercial operations with any lime-soda plant.

How closely this concerns the user of a waste-heat boiler will be apparent from a brief consideration of the following facts: Each 100,000 gallons of hard water evaporated will deposit in the boiler—143 lbs. of scale-forming matter for every 10° of hardness; 215 lbs. for every 15°; and 358 lbs. for every 25° of hardness.

Scale in a boiler causes (*a*) a great waste of heat, (*b*) an enormous unnecessary strain on the boiler. The fuel waste is not of cardinal consequence in the case of a waste-heat boiler; but to this must be added the wages paid for periodical chipping and cleaning, and the bill for boiler compounds and so-called scale-looseners, chemical or mechanical. The extra strain on the boiler may be gauged from the fact that, whereas the temperature of a clean boiler plate is 350° Fahr., the temperature of the same plate covered with ½ in. of scale is 750°—*i.e.*, the scale-covered plate has to be heated 400° above the temperature required to convert the water into steam. This is often a source of serious loss, and sometimes of danger. A ½-in. furnace plate covered with 1-10th in. of scale is as efficient a heat retarder as a steel furnace plate 10½ in. thick.

There is abundant evidence that, where waste-heat boilers are employed, it is not only essential to soften the water, but it is essential to soften it by the "Permutit" base-exchange process. In one of the best known and most widely used types of waste-heat boiler, the effect of even a small quantity of deposit, such as would be put down by an ordinary lime-softened water containing (say) 3° of hardness per gallon on the bottom tube plate of the boiler, is to cause such an overheating of this plate that leakages between the ends of the tubes and the tube plate speedily become apparent. It has been found with these boilers that water from an ordinary lime-soda plant which would be considered to be quite well softened, and carrying only 2 or 3 grains of hardness-forming salts per gallon, is wholly unsuitable for use with the waste-heat boiler for the reason mentioned.

The "Permutit" process has been adopted for the softening of the feed water at a number of important gas-works using waste-heat boilers, and the results have proved brilliantly satisfactory. A series of tests was carried out in the laboratory of the Bournemouth Gas and Water Company, where "Permutit B" plant has been in use for a considerable time. The water after treatment is used for feed for waste-heat tubular boilers and Stirling boilers; and the analysis of the hard water

before treatment is very similar to that obtained from the London Metropolitan Water Board's mains—viz., about 20° of hardness.

Two facts present themselves, and both of them are of great importance: (1) The record of degrees of total hardness of treated water *just before* regeneration, from Dec. 18, 1923, to Jan. 27, 1924 (inclusive), shows that, in spite of the pump having been occasionally overrun, the average hardness of the treated water in the first shift was 0·6°, second shift 0·75°, and the third shift 0·77°. The figures show that with such ordinary handling of the plant as can be given in a busy gas-works, where operation goes on for twenty-four hours per day (the plant being worked in three shifts of eight hours), practically perfect softening can be obtained; and we are confident that such results cannot be secured by any other material but "Permutit B." (2) Mr. P. G. G. Moon, the Chief Engineer and Manager, expressed himself as being entirely satisfied with the condition of the boilers, except for this, that he has found it desirable to use steel fittings on the boilers, instead of ordinary gunmetal ones.

The performance of this plant has been duplicated at the Stratford Works of the Gas Light and Coke Company, where two installations are at work. An order for a second installation has since been received from the Bournemouth Gas and Water Company; but this has not yet been put to work. Mr. J. S. Thorman, of the Stratford Works, has on many occasions referred to the excellent results; and we are advised that a boiler of the waste-heat tubular type was recently opened for inspection after eight months' continuous working day and night, the hard water being treated containing 17° of hardness in grains per gallon, of which 15° represents carbonate hardness. The boiler was found to be free from the slightest trace of scale. At these works "Permutit B" plant has been in operation for nearly three years; and with ordinary attention in respect of blowing-off the boilers, and thus keeping the concentration in hand, excellent results have been obtained.

# VOLUME, WEIGHT, AND OTHER PROPERTIES OF THE THERM.

By NORTON H. HUMPHRYS.

Gas engineers are accustomed to the advice that they should think in therms rather than in cubic feet; but this operation calls for full information, similar to the familiarity which has grown up in the course of years with all the twists and turns relating to the cubic foot. The same should be supplementary, and not a displacement of earlier experiences, because considerations relating to volume and weight will always be an essential feature in problems connected with manufacturing, purifying, storage, and measurement of gases. And the additions are not highly divergent in character, as they simply involve a change in objective from the maximum number of candle-feet per ton of coal carbonized to the largest possible yield of therms.

Much of the confusion, not to say suspicion, which attended the introduction of the new standard was due to such an unfortunate description as a "substitute" for the cubic foot—a word generally interpreted to mean the replacement of one thing by another, and the disappearance of the first. Consumers were puzzled because the cubic foot was retained on the quarterly bill, and the same meters remained in use. The statement that gas would be sold on a basis of quality led to an impression that former charges related to quantity only. But official standards of quality, and examiners to see that the conditions were not evaded, have been with us for fifty years or more. If one undertaking adopted a standard of 16, and another chose 12 candles, the second was expected to accept also a proportionally lower charge per 1000 c.ft. In one case it might be 4s., and in the other 3s. per 1000 c.ft., and in each the consumer received the same value—4000 candle-feet for 1s. The difference is that the B.Th.U. has displaced the sperm candle of 6 per lb., and the calorimeter has ousted the photometer from the official testing room. Gas was formerly valued on an illuminating basis, but is now rated by heating qualities; the candle-power did not show on the bill, but the therm is now a prominent item. The illuminating power was an invisible, but none the less an effective, factor.

A measure of energy may be used as a figure in value or price, if energy only is concerned; but when gas or other tangible substance is associated, it must be accompanied by a suitable measure of weight or bulk. Substitute for the supposition that the therm has displaced the c.ft. the fact that it has displaced the standard candle, and the air is considerably cleared, though "therm" conveys no definite meaning to the man in the street. Candle-power is a plain expression which is readily understood; but if an applicant at the gas office is informed that the therm is the equivalent of 100,000 B.Th.U., he is not much wiser than before, as the connection between declared value and quality factor is not so simple. Thus the impression that the Act of 1920 introduced an all-round change in working methods is now giving way to a feeling that, after all, there is only a slight difference in detail, and that the experiences covering the last eighty years are not so depreciated in importance.

The calorific value of town gas may be taken as the sum of the values of the individual combustible constituents. Obscure endothermic and exothermic actions may have their effect on the exact total, but there is no reason for supposing that they exist to any important extent in producer gas, blue water gas, carburetted water gas, or straight coal gas. These possess a family likeness, as, in all, the combustible constituents are composed, to the extent of 95 p.ct. or more, of hydrogen, carbon monoxide, and methane. The even 100 is made up by a large number of hydrocarbons consisting of the lower members of the methane, ethylene, acetylene, benzene, and naphthalene series. Much attention has been given to general analysis, but little to the effect of temperature and other working conditions on the composition of this class. The proportion of incombustible matter (also known as "diluent" or "inerts") varies with the description, and is greatest in producer gas, and least in unmixed coal gas.

Before proceeding to deal with the therm as commonly supplied, attention will be directed to the properties of the several constituents; and the following tables are based on gases at temperature and pressure conditions of 60° Fahr. and 30 in. Hg., and saturated with water vapour.

Following the usual practice, the water content is divided over the whole, though reasons might be stated for classing it as an inert, and taking the constituents in a dry or pure condition. Gas engineers have to deal with saturated gases up to the holder outlet; with gas saturated at the lowest temperature to which it has been exposed in transit, at the consumer's meters; and with an atmosphere which varies in humidity from month to month according to season, but averages over 80 p.ct. throughout the year. The saturated state is therefore a near approach to every-day working conditions.

The common distinctive expressions, "dry," "moist," "wet," are misleading in some ways. A substance dry to the sense of touch may contain a large quantity of water. A saturated gas at 60° is as "dry" in this respect as a water-free gas, though it contains the maximum of water consistent with retention of that condition at constant temperature. An excess beyond this condition is necessary to give evidence of moisture to the touch; of which fog or steam in course of condensation are examples. For practical purposes, dry gas may be regarded as 100 p.ct. pure, and saturated gas as 98·3 p.ct. pure, or, roundly, as 98·0 p.ct. at 60° Fahr. and 30 in. Hg.

Factors relating to volume, weight, or calorific value are generally used under the above conditions by gas engineers, without further definition. But in scientific work, the pure state is naturally preferred, or the metric standard of 0° C. (32° Fahr.) and 29·92 in. Hg. A clear understanding on these points is desirable, because the metric standard is 5·6 p.ct. greater than the English, on basis of volumes; and the difference between pure and saturated gases at 60° Fahr. is 1·7 p.ct In calculations which include estimation of heavy hydrocarbons by difference, a small error in respect to the principal constituents may exercise an important effect. As applying to weights, the difference between pure and saturated gases is not of much practical importance, as 1 c.ft. of gas at 60° Fahr., saturated, does not contain more than about 5½ grains of water. In Glaisher's hygrometric tables, the respective weights of dry and of saturated air at ordinary temperatures are stated as follows:

TABLE I.

| Temperature, ° Fahr. . . . . | 40°. | 50°. | 60°. | 70°. | 80°. |
|---|---|---|---|---|---|
| One c.ft. pure, grains . . . | 557·8 | 546·8 | 536·3 | 526·2 | .. |
| ,, saturated, grains . | 556·0 | 544·3 | 532·7 | 521·7 | 509·4 |
| Differences, pure, grains . . | .. | 11·0 | 10·5 | 10·1 | .. |
| ,, saturated, grains | .. | 11·7 | 11·6 | 11·6 | 11·7 |

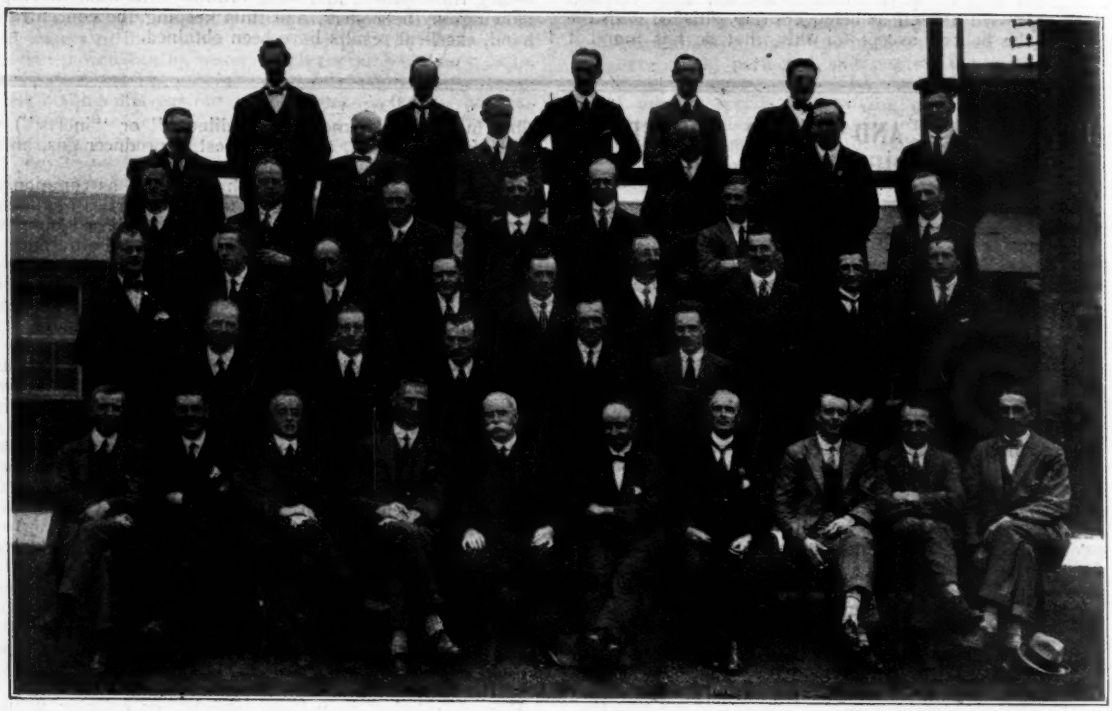
The pure air shows a slight reduction in the loss of weight, due to expansion as temperature increases; but within the above limits, saturated air shows an even reduction.

The several constituents of town gas possess both advantageous and objectionable features. Hydrogen is the more energetic heat producer, but its extreme lightness renders a mixture with heavier gas desirable from the practical distribution point of view. Carbon monoxide may be used for this purpose, but its proportions are limited by specific gravity and sentimental objections relating to its poisonous character. Methane is a good working gas, free from either of the foregoing objections; and large quantities are distributed in the United States in nearly pure form, under the name of natural gas. Carbon has never been isolated in gaseous form, and the figures stated are based on its behaviour when in combination with hydrogen or oxygen, of which methane and carbon monoxide are examples. The simple proportions between the specific gravities and oxygen requirements of hydrogen and gaseous carbon (1 : 12, and 1 : 3, respectively) bring about some curious co-

incidences. All the substances have the advantages of being practically insoluble in water, and stable at ordinary atmospheric temperatures. More importance turns on the constitution of the heavy hydrocarbons than might be supposed from their small proportion by bulk. The incombustibles at the best are diluents, being valueless from a commercial point of view, though occupying as much space in the condensers, purifiers, holders, mains and services, and meters and interior distribution system, as an equal bulk of the most valuable combustible. This alone shows the importance of keeping them as low as is consistent with the economical production of combustibles. With the exception of water vapour, which is liable to condensation on slight provocation, they are heavy, two to three times the weight of useful constituents; and nitrogen alone can claim to be an "inert." Oxygen, carbon dioxide, and water exercise corrosive effects on metals, and in combination seem more active than when isolated.

*(To be continued.)*

## THE MANCHESTER & DISTRICT JUNIOR GAS ASSOCIATION AT THE WORKS OF MESSRS. G. & T. EARLE, LTD.



*[Photo. by Turner & Drinkwater, Hull.*

[See report of visit in "JOURNAL" for Sept. 2, p. 540.]

### M'Ewen-Runge Low-Temperature Carbonization.

With the extended use of pulverized fuel in the United States, the market for pulverized semi-coke has greatly increased; and the M'Ewen-Runge system of low-temperature carbonization differs from most others in that it has been specially designed for dealing with pulverized coal. The process was first invented by Mr. S. M'Ewen in 1919, and was subsequently taken to America by Dr. Walter Runge—a full-scale experimental plant being erected at the power station of the Milwaukee Electric Railway and Light Company. Now an order has been placed by the Company for a larger plant, capable of dealing with 200 tons of fuel a day; and a drawing of this plant, together with a brief description, appears in the issue of "The Engineer" dated the 4th inst. Our contemporary states that it is expected shortly to construct a similar plant at a British colliery adjacent to a large steel works, where the gas and semi-coke fuel can be profitably employed in boiler and furnace heating. The process involves the pulverization of the fuel to be treated and its elevation to the top of an internally heated tower. The powdered fuel is then caused to fall down the tower in the form of a cloud, and in its downward passage it meets an upward current of hot inert gases. The extremely large surface which is presented by the finely divided fuel particles ensures a rapid interchange of heat, so that carbonization is effected during the time the fuel falls from the top to the bottom of the tower—a matter of only a few minutes. The system may be modified to operate in a variety of ways to suit the local demand for fuel and gas. It may be worked either as a single or as a two-stage process; but as the two-stage process has a higher thermal efficiency and is better suited for a wide range of fuel, it has been chosen for the plant described. The powdered fuel passes through two operations in two superimposed retorts. It is first heated to destroy its caking properties, and afterwards it is carbonized in the second retort. The sensible heat of the resulting semi-coke is used partly to provide the necessary heat for the first process.

### Westminster Technical Institute.

The continued prosperity of the gas industry depends to no small extent on the scientific and technical efficiency of its employees. In the past the technical education available for employees in the industry has mainly dealt with technical processes in their more practical aspects, but it is now realized that a mere practical knowledge, unsupported by familiarity with scientific principles, will not produce the type of employee to whom the industry can look with confidence for the maintenance and enlargement of its commercial interests. The fruit of this more enlightened view is seen in the education scheme of the Institution of Gas Engineers in conjunction with the Board of Education. The scheme does not cover the award of grouped course "Trade" certificates, but the scope of the examination scheme of the City and Guilds of London Institute has now been enlarged to provide for the issue of group course certificates in gas-works practice, gas supply practice, and gas-fitting, together, in each instance, with mathematics, drawing, and science. Special evening courses in preparation for the examinations of the Institution and of the City and Guilds of London Institute will be available during the ensuing session of the Westminster Technical Institute. For many years the Institute has worked in close association with the gas undertakings in and around London; and the possession of a staff of able and experienced teachers has rendered it possible to organize courses of study exactly adjusted to the requirements of the various classes of employee in the industry. The laboratories and workshops are equipped with the most modern appliances and apparatus, and make ample provision for the experimental and practical work required by students preparing for the various examinations. The session 1925-26 commences on Monday, Sept. 21; and the Principal, Mr. J. Stuart Ker, B.Sc., will be pleased to forward to intending students and others interested in the work of the Institute copies of the prospectus for the session, containing full particulars of the courses of instruction, syllabuses of work, and fees.

## FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

**Sept. 16-17.**—REFRACTORY MATERIALS SECTION OF THE CERAMIC SOCIETY.—Meeting in the rooms of the Chemical Society, Burlington House, London, W.

**Sept. 23.**—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Autumn meeting at Stamford.

**Sept. 24.**—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.—General meeting at Cardiff.

**Oct. 15.**—MURDOCH LODGE.—Meeting.

**Oct. 19-21.**—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual conference and general meeting in Plymouth.

**Oct. 30.**—LONDON & SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute.

INSTITUTION OF GAS ENGINEERS.

**Oct. 12.**—4.15 p.m., Calorimeters Committee.

**Oct. 12.**—2.30 p.m., Refractories Research Joint Committee.

**Oct. 13.**—4.0 p.m., Consultative Committee of the Education Scheme, followed by meeting of the Advisory Committee.

**Oct. 14.**—3.0 p.m., Wrought-Iron Tubing Inquiry Committee.

**Oct. 14.**—6 p.m., Joint Meeting, at the Institution of Civil Engineers, Great George Street, Westminster, with bodies co-operating in the work of the Special Committee on tabulating the results of heat engine trials.

**Oct. 22** (provisional).—2.30 p.m., Emergency Committee. 3.15 p.m., Finance Committee. 3.45 p.m., Council Meeting.

**Oct. 28.**—EVENING STAR LODGE.—Meeting.

**Nov. 10.**—4 p.m., Advisory Committee on Education.

**Nov. 11.**—11.30 a.m., Emergency Committee. 12.15 p.m., Benevolent Fund Committee of Management. 12.45 p.m., Finance Committee.

**Nov. 25.**—11 a.m., Institution's session at the Public Works, Roads, and Transport Congress.

**Nov. 25.**—EVENING STAR LODGE.—Meeting.

**Dec. 2.**—Official visit to the Shipping Engineering and Machinery Exhibition at Olympia.

**Dec. 8.**—4 p.m., Advisory Committee on Education.

**Dec. 9.**—11.30 a.m., Emergency Committee. 12.30 p.m., Finance Committee.

## REGISTER OF PATENTS.

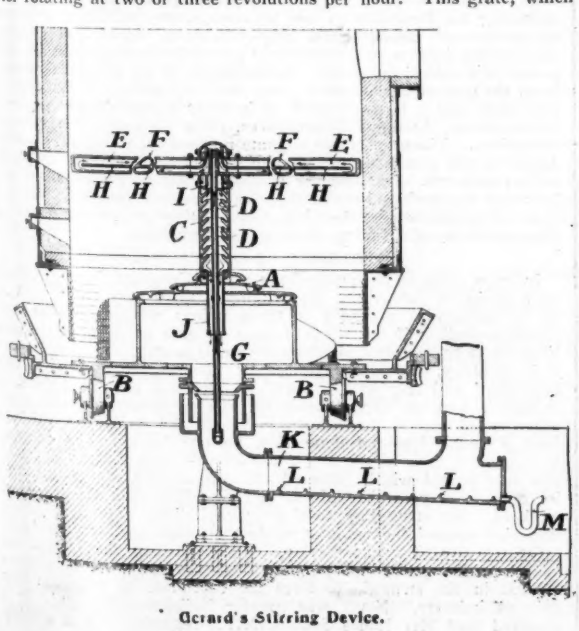
### Gas Generators.—No. 226,173.

GERARD, C., of Nogent-sur-Marne.

No. 27,277; Nov. 14, 1924. Convention date, Dec. 12, 1923.

The object of this invention is to provide in gas generators a device for automatically spreading and stirring the fuel, of the kind comprising a rotatable grate and arms mounted on a rotating support. These arms are water-cooled, and the steam produced is used by being mixed with the air drawn in beneath the grate. A form of generator constructed according to the invention is shown in the accompanying diagram.

The generator comprises a rotatable grate A, which is arranged for rotating at two or three revolutions per hour. This grate, which is of sufficiently solid construction to support the additional weight of the stirring device, revolves upon the rollers B. The device itself consists of a hollow steel column C, the internal wall of which is provided with circular flanges D. The height of the column depends on the physical properties of the coal usually employed. At the upper part of the column is mounted a crossed frame consisting of at least four hollow arms E in a horizontal position, and arranged 10 to 15 cm. below the level of the free surface of the fuel. These arms have a cross-section as shown at F, so as to operate after the manner of ploughshares. A conduit G traversing the grate and the column C supplies cold water to the upper part of the frame. The partitions H cause the cold water to circulate in the direction of the arrows, and by means of a tubular extension I secured to the lower part of the frame, the excess of hot water, and the steam which is formed and separated, will reach the column C, where the water and steam will be further separated by the action of the flanges D; the latter at the same time providing an efficient means for cooling the column. This column has a tubular extension J, in passing through which the steam and the hot water will meet with the air supplied by the conduit K. The excess of hot water flows through the conduit and through a baffle device L, and is finally discharged through the siphon M. The output of the latter indicates by its difference from the supply of cold water the quantity of steam formed in the apparatus, so that the supply of cold water can be regulated according to the amount of steam required.



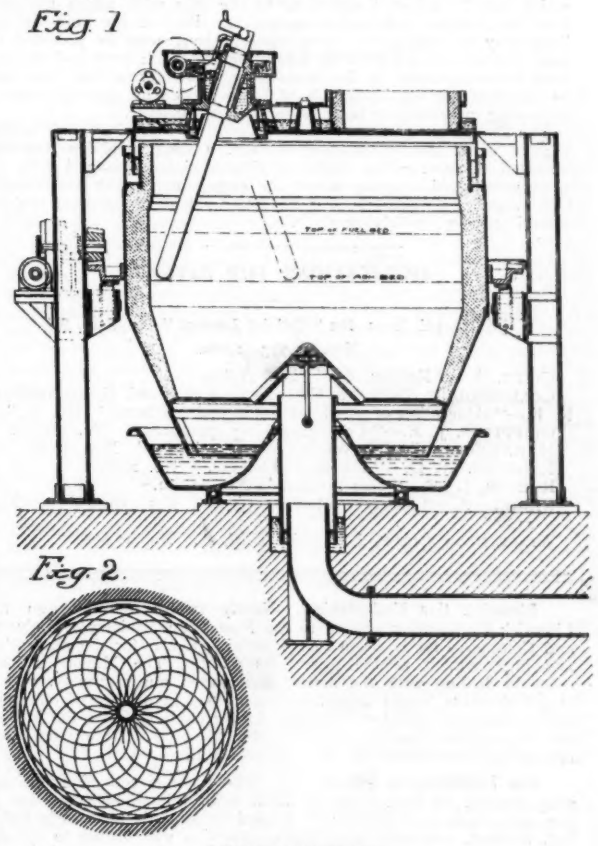

Gerard's Stirring Device.

### Gas Producers.—No. 238,421.

JOHNSON, J. Y., of London; a communication by Wood, W., of Philadelphia, U.S.A.

No. 27,238; Nov. 14, 1924.

This invention relates to gas producers of the kind in which a water-cooled hollow stirrer bar for agitating the fuel bed is mounted in an inclined portion of a carrier which is free to turn in a fixed bearing supported on a stationary top-plate, or cover, of the gas producer; this cover having an opening through which the body portion of the stirrer bar extends. Water-seals are provided whereby gas is prevented from escaping between the carrier and the cover, and also between the cover and the rotatable body portion of the producer. It has been proposed to oscillate the carrier in its bearing, so that the lower end of the stirrer bar travels in an arc of a circle; the means for oscillating the carrier being actuated by the same motor that effects the rotation of the body portion of the producer. This invention mainly consists in providing means whereby continuous rotary motion is imparted to the carrier so that the lower end of the hollow stirrer bar is caused to operate in a series of advancing convolutions as the body portion of the gas producer rotates; in providing an annular chamber in the carrier, into which cooling water, after circulating through the hollow stirrer bar, is delivered; and in providing independent motors for driving the carrier and the body portion of the gas producer, so that any distortion of the cover does not affect the drive of the carrier.




Johnson's Stirrer Bar.

Fig. 1 is a vertical section of the producer and stirring device, and fig. 2 is a diagram illustrating the path of the stirrer bar in making a complete rotation in the producer.

## Gas Meter Stuffing Boxes.—No. 238,349.

COOKE, A. G., and PHILLIPS, B. J., both of Hove.

No. 17,036; July 16, 1924. No. 1660; Jan. 19, 1925.

The objects of this invention are to prevent any leakage of gas, to provide a stuffing box attachment to remove the cause of a meter registering against the consumer for gas which has not been consumed, and to provide an attachment adapted to fit any size of spindle, shaft, &c., used by the various manufacturers of gas meters.

The invention comprises a spring of a conical form mounted on the crankshaft and/or shafts of spindles connected to the escapement mechanism. The lower end of the spring is turned downwards, so as to form contact with the crankshaft whereby, on rotation of the latter, the spring will revolve simultaneously. Over the spring is mounted a washer of leather, surrounded by a metal cover. The upper part of the spring is also surrounded by the cap; and this causes the combined washer and cap to revolve with the spring on rotation of the crankshaft. Over the combined cap and washer are fitted additional washers; the whole forming a sealing on the surface of the valve plate, cock plates, or stuffing box containing packing material or a suitable grease.

In a modification of the invention is provided a hollow metal casing in two parts, whereby the upper member forms a removable cover adapted to fit into the other member, and each is provided with a central orifice. Into the hollow casing is inserted a conical spring and a leather washer; and the cover when inserted thereover is mounted on to the crankshaft, to which the base of the casing is soldered, causing them to rotate together. The pressure of the enclosed conical spring causes the washer to project slightly out of the casing around the central orifice on the upper side, creating a springy pad, on to which the stuffing box presses by having one or more washers interposed. The conical spring places upon the meter a given tension, and can be fitted to the various sizes of spindles and shafts adopted by manufacturers of gas meters. It allows certain movement of the crankshaft out of the perpendicular.

The complete attachment in either modification can be supplied as a separate fitting, being adaptable to existing meters.

## Coin-Freed Mechanism.—No. 238,475.

SIMPSON, S., of Exmouth.

No. 7197; June 17, 1924.

According to this invention, the coin-freed mechanism comprises a coin holder rotatably mounted upon a stationary adjustable price-changing disc, a coin-operated lever mounted upon the holder and adapted to be modified in form for operation by coins of different diameters, a measuring wheel with which the coin-operated lever engages under the action of a coin of determined diameter carried in the holder, and valve controlling and operating mechanism actuated from the measuring wheel and provided with gear the ratio of which can be adjusted according to the coin with which the coin-freed mechanism is intended to operate. Part of the coin-operated lever may be adjustable, or a separate lever may be provided for each size of coin, or, between a pawl or bell-crank lever and the coin (and advantageously in the same plane), an intermediate lever may be interposed which is capable of being moved by the coin, and of imparting movement to the pawl or bell-crank lever.

The change gear advantageously comprises a driving shaft having a gear wheel fixedly mounted thereon, a slidable pinion rotatably mounted thereon, a lay shaft carrying a pinion engaged with the gear wheel and a gear wheel for engagement with the slidable pinion, and means for moving the latter out of engagement and for clutching it to the driving shaft.

## APPLICATIONS FOR PATENTS.

**[Extracted from the "Official Journal" for Sept. 9.]**

Nos. 21,713-22,261.

CLIFF, A.—"Retorts, &c." No. 21,879.

GOLDSBROUGH PATENTS COMPANY, LTD., and GOLDSBROUGH, R. E.—"Generation of gas from liquid hydrocarbons." No. 21,854.

GRIFFITHS, J. E.—"Coke-quenching apparatus." No. 22,220.

MANNESMANNRÖHREN WERKE.—"Pipe joints." No. 22,061.

REDFERN, W. D.—"Gas-heated boilers." No. 21,822.

REEVES, J. W.—"Gas turbine." No. 21,802.

RINGE, A.—"Safety attachment for gas control cocks." No. 21,888.

WILLIAMSON CLIFF, LTD.—See Cliff, A. No. 21,879.

**Limerick Gas Undertaking.**—Nearly twelve months ago the Limerick Corporation applied to the Free State Ministry of Industry and Commerce for sanction to a loan of £30,000 for the renovation and improvement of the gas-works plant. The Ministry's long delay in dealing with the matter has caused much anxiety, and it is felt that the works cannot be maintained in a state of efficiency unless money is soon forthcoming. In the circumstances, the Mayor, the Corporation Law Agent, and the Manager of the works are arranging to interview the Ministry authorities.

**Gas Exhibition at Elland.**—The Elland-cum-Greetland Gas Company opened, on Sept. 7, at the Drill Hall, Elland, an exhibition of gas appliances, particularly with regard to domestic services in lighting, heating, and cooking. Special attention was drawn to the desirability of the complete gas home. The pull-or-push switch-controlled lighting was demonstrated, as also was the automatic oven heat controller. Lectures and cookery demonstrations were given daily by Miss H. Tuxford, M.C.A., and there were competitions for housewives and children. The exhibition was very ably organized by Mr. J. Bridge, Manager to the Company.

# MISCELLANEOUS NEWS.

## THE TRADE UNION CONGRESS.

### Changed Policies in the Labour World.

The proceedings at the Trade Union Congress at Scarborough last week were illustrative of the large measure of influence and control which the extremists in the labour world have secured, not only in this body, but in all the trade unions of the country. There was, as usual, a perfect medley of resolutions proposed—mostly bad—and the discussions of these revealed the power that the ultraist section of the labour world has secured in the work of the trade organizations. One sees in this a parting of the ways from the old ideals of trade unionism, with the permeation of the work of the Congress and of the unions by communistic and revolutionary schemes. The tendency in this direction was seen even in the Presidential Address of Mr. A. V. Swales. But we will not labour the point, and will simply confine ourselves to the more notable features of the week's proceedings. At the same time, it should at once be said that the extremists through their revolutionary proposals did not by any means get things all their own way. Many of the old leaders who believe in evolution rather than revolution stood in the path, and used their influence to curb the ardent spirits of those of extravagant view, and to help to direct the voting in the way it should go; but, even so, there were in the speeches of some of these leaders a trace of a change of view on many important subjects.

#### UNEMPLOYMENT AND PRODUCTION.

One point regarding the Presidential Address. Mr. Swales stated that since the end of 1920, when the economic slump begun, wages cuts had aggregated many hundreds of million pounds. In addition, the trade unions have borne a dead-weight burden in the form of abnormal unemployment, which naturally has depleted their financial reserves, and has caused a falling-off of membership, which, in turn, has caused the income of the unions to be substantially reduced. In the view of the President, there is a limit to the concessions which the unions could be forced to make, and, in his opinion, that limit has now been reached. This brought him to the subject of the programme of the trade union movement, from which we gather that the policy of the unions henceforth will be to recover lost ground, re-establish and improve the standard of wages, hours, and working conditions, and co-ordinate and intensify trade union action for the winning of a larger measure of control in industry for the workers. Throughout the Presidential Address and the week's proceedings, we cannot find that anything was said regarding the need for labour to exert itself if it is to enjoy more wealth from industry; nothing was said as to the necessity for increasing production in order that the working class may be better off. On the other hand, a delegate from the U.S.A.—Mr. Evans—frankly advocated co-operation between the employer and employed; and he emphatically told the delegates that high wages and a high standard of living in this country were due to high production.

#### THE ONE UNION POLICY.

Probably the cardinal issue of the whole proceedings was the ideal of the communists for one big union, with always hovering above industry a general strike of the whole of the workers of the country if there was not compliance with the mandates of the lords of the organization. What was proposed was that all the existing unions should be amalgamated, with the ultimate idea of forming one big union for the entire country. On this point, the extremists were severely defeated. A point that was certainly not recognized in this connection by many of the speakers was that every industry has its own special conditions in regard to work, and therefore the nature of employment; and it would be absolutely impossible to standardize or unify all those conditions, in order that one unwieldy and comprehensive union could deal with the whole of the questions involved. But what was realized by some of the speakers was that, assuming the formation of one big union, the individual autonomy of the present unions would largely cease to exist; and many of the present leaders are disinclined to hand-over any part of their power to a central authority. Furthermore, at the present time there is on the part of the unions a great deal of poaching on each other's preserves, and a large amount of jealousy regarding the power of other unions. In these circumstances, there cannot be unity between the unions. These and other cognate matters led to the very positive defeat of the resolution which aimed at the amalgamation of the unions into one. But there is another aspect of the question; and it is that the rank-and-file of the various trade unions have not paid their subscriptions with the idea of their being utilized for fomenting class warfare and bringing about social disruption.

#### OVERTHROW OF CAPITALISM.

In most parts of the proceedings at the Congress, insane opinions were projected into view. For example, there was foolish talk as to the imperative necessity of trade unions taking steps to overthrow capitalism if the workers were to gain more for themselves. Even those thrifty persons who have saved money, and have invested it in industry, were characterized by one speaker as "£100 millionaires," and they had censure and reproach cast upon them, as though it were an unpardonable sin to save money and help in the provision of capital for industry. Where the workers would have been if people had not done this, no one knows. The delegates having aired their views *pro et con* on this subject, another resolution was passed which favoured the organization of the movement in order to prepare the unions, in conjunction with the "party of workers," for struggling to destroy capitalism. The same resolution also warned the workers against attempts to introduce "capitalist schemes of co-partnership," and expressed the opinion that strong, well-organized shop committees are indispensable weapons for use in the struggle to force the capitalists to relinquish their grip on industry. Never was greater foolishness displayed. It is observed that Mr. James Sexton, M.P., regarded this as a thinly

veiled attempt to pledge the Congress to communism. However, it will be observed from the terms of the resolution, that it does not commit the Congress to any definite line of action, nor does it instruct the General Council or any other body to get on with the work adumbrated in the resolution.

APPROVED AGREEMENTS.

Then, among many others, a resolution was agreed to which, if carried to its logical conclusion, will compel the bad employer to come into line with the good one, and will give voluntary agreements approved by a joint industrial council the same validity as awards under the Trade Boards Act. To put it another way—conditions of labour which in the opinion of an industrial council are fair for a particular industry will become compulsory through that particular industry, and then there will be less reason on the part of labour agitators to talk of "sweating" the workers.

Altogether, the Trade Union Congress of 1925 will have an important place in the annals of labour. It shows more definitely than has ever been done before the counter-currents which are running in the labour world, to the disadvantage of the country, and particularly to that of labour. No effort is being made by the trade unions to help the recovery of industry; every scheme which opposes it is being fostered.

## LAYING A 36-IN. MAIN IN LONDON.

### Connecting the Kensal Green and Fulham Works.

[From the current issue of the Gas Light and Coke Company's "Co-Partners' Magazine."]

During the last eighteen months a 36-in. main has been laid to connect the Gas Light and Coke Company's works at Kensal Green to the works at Fulham, and so to the system of high-pressure mains which connect Beckton with all the other manufacturing stations.

The main is about 4½ miles in length, and for nearly the whole distance the route lies in the Royal Borough of Kensington. It was found possible to choose a route which avoided the more congested roads, while keeping a fairly direct line between the two works. (The distance between Fulham and Kensal Green as the crow flies is 6100 yards.)

The chief difficulties were experienced in crossing the railways and the main roads running east and west. There were three railway crossings—viz., Stanley Bridge over the West London Railway, Warwick Road Bridge over the District Railway, and a crossing under the Great Western Railway to enter Kensal Green Works from Barlby Road. There was not sufficient depth on either of the bridges to enable a 36-in. diameter main to be laid, so special means had to be adopted.

In the case of Stanley Bridge a steel tube of elliptical section (4 ft. 3 in. by 1 ft. 10 in.) was fitted in between the bridge girders under the kerb line on the north side; and even so it was necessary to cut away some of the concrete forming the floor of the bridge. The space between the girders and the tube was filled in with concrete, and concrete was also carried over the top of the tube.

At Warwick Road Bridge the Railway Company allowed the Company to replace one of the jack-arches under the footway by a reinforced concrete slab 9 in. thick, thereby increasing the depth under the paving stones from 20 in. to 30 in.; and they were thus able to fit in two 24-in. diameter circular steel tubes, which were connected together and to the 36-in. main at each end. These tubes were surrounded by concrete.

The crossing under the Great Western Railway at Kensal Green was a big undertaking, necessitating the driving of a tunnel, 8 ft. by 6 ft. in cross-section, under the six railway tracks, a length of 100 ft. The ground level in the Kensal Green Works is 16 ft. above the railway level, so a shaft 30 ft. deep was made in the works, and the heading driven under the retaining wall from this point. The tunnel was also driven from a point on the Barlby Road side of the railway tracks. It was necessary to excavate the tunnel from both ends simultaneously, and to work day and night, in order to meet the requirements of the Railway Company, who were obliged to slow-down all their trains when passing over the tunnel until the main had been laid through, and the tunnel filled in. Circular steel tubes, 36 in. in diameter, were used for the main through the tunnel; and the whole was filled in with concrete.

The crossings of Kensington Road and Holland Park Avenue were carried out by driving headings in a similar manner to the crossing under the Great Western Railway, but the headings were of smaller section and less heavily timbered. In the case of Kensington Road, it was necessary to drive, owing to the main having to pass under a sewer; and in Holland Park Avenue the presence of five 30-in. and one 36-in. water mains made it impossible to cut a pipe trench from the surface.

On the remainder of the route the main-laying was of a straightforward character; but it was necessary to re-lay about 3000 yards of small mains, belonging either to the Company or to the Metropolitan Water Board, in order to obtain sufficient room for the laying of the 36-in. main. These small mains were re-laid on benchings cut in the side of the trench for the large main.

The total cost of the main is in the neighbourhood of £100,000, of which over £15,000 was paid for reinstatement of the road surface on the line of the trench.

The point where the main crosses Holland Park Avenue (from Holland Road to Norland Road) is within 100 yards of the boundary between the Company and the Brentford Gas Company; and connections from the new main at this point will be used for giving a bulk supply to the Brentford area.

The Usk Urban Council have accepted the tender of the Usk Gas Company for the lighting of the street lamps from Sept. 14 to April 17 next at £2 16s. per lamp—a reduction of 5s. per lamp as compared with last year.

## BELFAST GAS EXHIBITION.

### Lord Mayor's Tribute to Mr. J. D. Smith.

A fine gas exhibition by the Belfast Corporation, in the Ulster Hall, had a successful send-off on Tuesday, the 8th inst., when the opening ceremony was performed by the Right Hon. the Lord Mayor (Alderman Sir William Turner), with ex-High Sheriff H. M'Laurin (Vice-Chairman of the Gas Committee) in the chair.

The CHAIRMAN spoke of the great developments in the gas industry, and of the desire of the Corporation not only to keep in touch with this progress, but also to keep the public informed of the many new appliances available. For this reason they were holding the present exhibition.

The LORD MAYOR recalled that the last exhibition in Belfast was in 1911. It was at that time intended to organize another one three years later; but the war intervened. In the first place, the scope of the exhibition was very wide, as they would find in it examples of almost every application of gas for lighting, heating, cooking, or labour saving. Special mention might be made of the exhibit showing the manufacture of incandescent mantles, now seen for the first time in Belfast. Then there was a fine display of gas-heated industrial apparatus, which should interest manufacturers and engineers. But perhaps, as in most exhibitions, it was the domestic side that would appeal more to the general public than anything else; and the Gas Committee, recognizing this, had arranged for free cookery lectures twice daily. Speaking in particular regarding one exhibit—viz., that relating to the chemical works—he said this works was one of the latest infants adopted by the Gas Committee, which, under the fostering care of its guardian (their worthy Engineer, Mr. J. D. Smith, M.Inst.C.E.), had rapidly grown into a lusty child; the profits last year amounting to £70,354. They were now selling gas at 2s. 4d. per 1000 c.ft. for domestic use and 2s. for industrial purposes. Last year they carbonized 170,252 tons of coal, and used 1,339,426 gallons of oil. They sold 3610 million c.ft. of gas, making a profit of £110,671, and increasing the sales by 3½ p.ct. They had now 89,802 consumers on their books, supplied through 500 miles of mains. These figures showed that the gas business was still in a very healthy condition, and likely to remain so for many years to come. Indeed, it might be considered to have entered upon an era of prosperity of which no man living could see the end.

Replying subsequently to a vote of thanks, the LORD MAYOR said Belfast had a remarkably cheap supply of gas; and he thought their satisfactory position was largely due to the fact that they had one of the most competent Managers in the United Kingdom. Mr. Smith was not only a very able Engineer, but he was blessed with a commercial mind. During the war he saved Belfast and the gas undertaking thousands and thousands of pounds in the purchase of the raw material for gas manufacture. Since Mr. Smith entered their service, he had not cost the Corporation a halfpenny, having saved more than his salary by his careful and shrewd purchases.

The exhibits will be referred to in greater detail in next week's issue of the "JOURNAL."

## WOKING GAS COMPANY.

A very encouraging outlook was reported upon at the meeting of the Woking District Gas Company, at which Mr. LAWRIE TREWBY (Chairman) presided.

The CHAIRMAN, commenting on the state of affairs, said they would notice that the increase for the half-year was shown at 9·75 p.ct. New consumers for the half-year numbered 118, showing that the district was increasing very rapidly. During the year the Company raised £5000 redeemable debenture stock. They did this because the Public Utility Companies (Capital Issues) Act expired in May, and they took the opportunity of raising that amount before they lost these powers. On the expenditure side they had charged to new buildings and manufacturing plant £6310. In their revenue account, coal and oil showed a slight increase, due to the larger amount of gas sold. On the receipts side, the sale of gas and rental of meters and stoves were up by £1200; the price being the same as last year. Residuals, however, showed a drop of £1800, due, chiefly, to the fall in the value of coke. Their revenue was down by £400. A coke-cutting machine had been installed; and he was glad to say the results had been most gratifying. Consumers had realized that by using the "smokeless nuts" which the Company supplied, they were obtaining a fuel of constant quality, constant size, and practically constant price, as against the varying quality, size, and price of coal. It was also considerably cheaper than coal, and half the price of anthracite. He thought the future of coke lay very much in selling it in broken form to small consumers for household use. After providing for dividends of £2297, there was a sum of £3037 to carry forward, which was about £13 more than they brought in. The new showroom was still doing remarkably well. During the half-year they had disposed of 233 cookers, fires, and other appliances, and their consumers now numbered 5159.

Mr. H. A. LERMITTE seconded the adoption of the report and accounts; and the proposition was carried.

The CHAIRMAN proposed that dividends for the half-year be paid at the following rates: "A" and "B" ordinary stocks, 6 p.ct. per annum; "C" preference stock, 5 p.ct.; 5 p.ct. redeemable preference stock, 5 p.ct.; and 8 p.ct. redeemable preference stock, 8 p.ct.

This was carried.

A vote of thanks to the officials and workmen of the Company brought the meeting to a close.

The Buckley Gas Company have submitted the following prices to the Buckley Urban Council for the lighting of 120 street lamps for the next six months: October, 7s. 2d. per lamp; November, 8s. 1d.; December, 9s.; January, 9s.; February, 7s. 5d.; March, 6s. 9d. It was decided to accept the tender.

## TRADE NOTES.

**"St. Andrew" Radiators.**

Messrs. John Wright & Co. (members of Radiation Limited) have published a new list giving details of their "St. Andrew" gas-heated steam radiators. The publication, which includes illustrations of a few of the buildings in which these radiators are giving highly satisfactory service, has been prepared in a most pleasing way.

**"P-A-L" Globes.**

A booklet of uncommon interest has been published by the Provincial Incandescent Fittings Company. Besides pointing to the advantages of "P-A-L" globes, the booklet contains much matter of general interest. It is, in fact, similar to the magazine programmes which of late have become so popular in the West-End theatres. "P-A-L" globes are made of a specially designed wire mesh, so strong that they will last a lifetime, and so fine that no particle of hot mantle can penetrate. The globes completely surround the mantle; and the firm claim that they give 33 p.ct. more light than an all-clear glass globe.

**Pulverizing Machinery.**

International Combustion, Ltd., of Africa House, Kingsway, announce that, owing to the rapid expansion of the business handled by their Commercial Pulverizing Department, this section has now been transferred to separate offices, situated at No. 11, Southampton Row, London, W.C. 2. An arrangement has been entered into with the Hardinge Company whereby International Combustion, Ltd., will now be in a position to offer clients, alternatively, mills of the Hardinge or Raymond type, together with a wider range of screens, air separating plant, lime-hydrating plant, automatic pulverizing units, &c., all of which will be manufactured in this country. Mr. J. C. Farrant has been appointed General Manager of this Department, and Mr. C. S. Messenger Sales Manager.

**Messrs. Ashmore, Benson, Pease & Co., Ltd.**

The firm have recently completed the erection of a steel tank, 231 ft. diameter by 40 ft. 9 in. deep, and a four-lift gasholder with steel guide framing, at the La Salle Works of the Montreal Light, Heat, and Power Consolidated, Montreal. The capacity of the holder is 6 million c.ft. About the same time they also completed for the Toronto Consumers' Gas Company, at Station "A," the erection of four purifiers, with steel and cast-iron substructure. The Consumers' Gas Company also entrusted an order for six water-cooled condensers to Messrs. Ashmore, Benson, Pease & Co., which were finished at the same time as the purifiers. The firm have now received an order for a further set of four boxes; this being the fourth installation supplied to the same Company in Toronto. For the Newcastle and Gateshead Gas Company's Elswick Works, the firm have in hand five purifiers; and at the Redheugh Works an old guide-framed gasholder was dismantled, and a new four-lift spiral holder of 2 million c.ft. capacity is being erected in the old tank. A two-lift spiral guided holder and steel tank are in course of erection at Settle (Yorks.). In May last the Metropolitan Gas Company, of Melbourne, Victoria, placed an order with Messrs. Ashmore, Benson, Pease & Co. for a steel tank and a three-lift guide framed holder of a capacity of 3 million c.ft. This tank and holder are now in course of erection at Melbourne under the supervision of Mr. Stokes, Outside Superintendent of the firm; and it is anticipated the contract will be finished by the end of January, 1927.

## CONTRACTS OPEN.

**Pipes and Specials.**

The Gas and Water Department of the Clacton Urban District Council are inviting tenders for cast-iron pipes and specials. [See advert. on p. 684.]

**Purifiers.**

The Corporation of the City of Dunedin, New Zealand, are inviting tenders for the supply and delivery of a set of purifiers. [See advert. on p. 685.]

**Carbonizing Plant and Coal Store Extension.**

Tenders are invited by the Gas Committee of the Ashford (Kent) Urban District Council for extensions to their carbonizing plant and coal stores, &c. [See advert. on p. 685.]

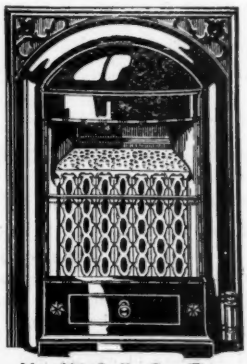
**Retort Bench Extensions, Ironworks, &c.**

The Gas Committee of the Marple Urban District Council are prepared to consider tenders for an extension of the retort bench at the Marple Bridge Gas-Works. [See advert. on p. 685.]

**Increase in Price at Swadlincote.**—At a recent meeting of the Swadlincote Urban Council, it was decided that gas charges to slot meter consumers be increased as from Oct. 1 next as follows: Within the district, ordinary and free-fittings prepayment meters, 14 c.ft. per 1d.; and outside the district, 13 c.ft. per 1d. It was reported that the amount of gas distributed in July was 4,227,500 c.ft., as compared with 3,657,000 in June, and 3,891,400 in July of last year.

**Bexhill Water and Gas Company.**—The report of the Directors for the half-year ended June 30 will be submitted at the general meeting on Sept. 22. The revenue account shows a total profit of £10,459. Including the sum of £6269 brought forward, and after providing for fixed charges and placing £2000 to the contingencies fund, there remains the sum of £12,277 available for dividends. Under clause 10 of the agreement with the Corporation of Bexhill, made on May 27, for the transfer of the Company's undertakings, the Company are entitled to declare dividends upon their shares at the following rates: 8 p.ct. per annum on the 10 p.ct. maximum ordinary shares; £5 12s. p.ct. on the 7 p.ct. maximum ordinary shares; and 5 p.ct. on the preference shares. The Directors recommend dividends accordingly, less income-tax. This, with the provision for income-tax, will absorb £5382; leaving £6894 to be carried forward.

By Appointment
Ironfounders to
H.M. The King.



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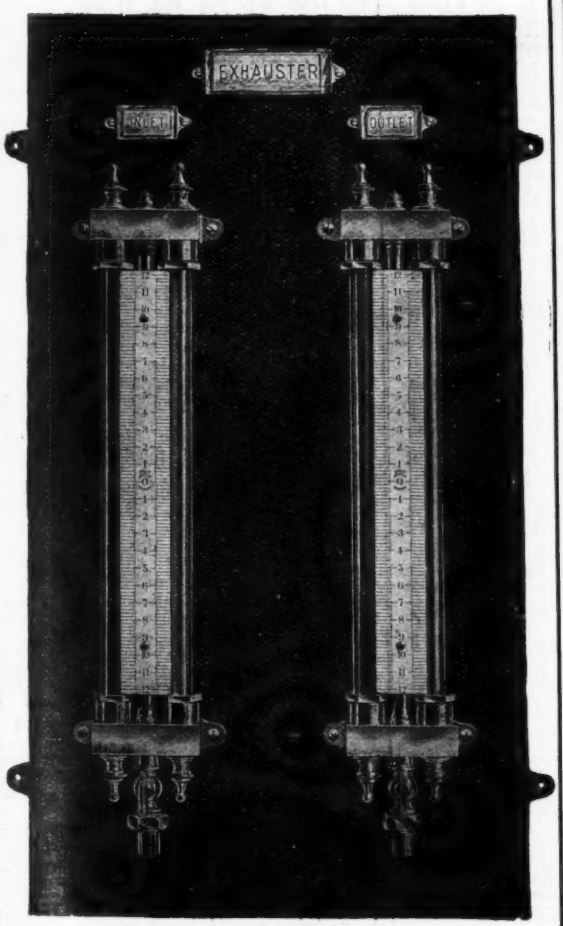


No. 146.

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## NORTH-EAST COAST COAL TRADE.

**From our Own Correspondent.**

The week has closed with a note of quiet optimism in most quarters, and hopes are again freely expressed that the worst is over. A good deal of inquiry has been circulating, which is considered as a good sign, and one which has been lacking for so long. Even if no volume of business has matured as yet, it is felt that those who are now sounding the market will find present prices favourable in competition with German coals. The nature of some of the inquiries clearly indicates that Continental buyers have this in view. Sellers on this side are therefore beginning to take heart, and quotations are inclined, if anything, to stiffen slightly, especially for forward business. Naturally, with the output as limited as it is at the present time, no great improvement in values can be expected. But any definite indication that the worst is over will greatly encourage new business.

Northumberland steams are steadier; but there is still no improvement in the coking section. Demand seems to be entirely lacking, and a quotation of 13s. for unscreened makes does not bring orders. For Wear Specials and best quality gas makes the price is about 16s. 6d. to 17s., and they are fairly well placed and steady in tone. Second-class gas are 13s. 6d. to 14s. Durham unscreened bunkers are obtainable at 14s. 6d. for good qualities.

## COAL TRADE IN THE MIDLANDS

**From our Local Correspondent.**

While there is no movement in the gas coal market, deliveries under contract are accepted more regularly. The coming reversion to the solar reckoning will involve a big increase of demand on undertakings whose lighting load is the predominant factor, and arrangements are being made to augment the coal deliveries accordingly. Colder weather is sending up the consumption for heating. There is no sign of improvement in the industrial load, the ebb and flow of seasonal trades making little difference on balance. Household coal is being stocked only slowly, and values are unsteady except for the high grades. Collieries are not hurrying matters. A disproportionate accumulation of smalls is not to be avoided, however, in the continued depression of the heavy trades, and prices below those listed have to be taken. The weakness has extended to D.S. nuts. Spot lots are offered at rates materially lower than the general level in order to relieve stocks that have grown unwieldy. The market is still disorganized by emergency coal, which was put on rail and has not yet been entirely cleared. There is only a small demand for coke. Though seconds can be bought at 11s. at ovens, or even less, reliable grades of blast-furnace coke generally command 2s., and in some cases 3s., more.

## YORKSHIRE AND LANCASHIRE COAL TRADE.

**From our Local Correspondent.**

There is little improvement to report in regard to the coal trade in Yorkshire and Lancashire this week. House coal moves slowly owing to the mildness of the weather, but it is anticipated there will be the usual demand towards the latter part of the month.

Industrial fuel of the lower grades is difficult to dispose of, and as yet there are no signs of an improvement. The export market continues unusually dull, and the inquiries received from the nearer Continental countries are based at a very low f.o.b. price—considerably below the cost of production.

Gas undertakings are using a proportion of the coal they put into stock prior to July 31, and in some instances contract quantities are not being taken.

Humber bunker and export prices (f.o.b. usual shipping ports) are: South Yorkshire—Hards, Association, 19s. to 19s. 3d.; screened gas coal, 17s. 6d. to 18s.; washed trebles, 17s. 6d.; washed doubles, 16s. 9d. to 17s.; washed singles, 15s. 3d. to 15s. 6d.; washed smalls, 12s. 3d. to 12s. 6d.; unwashed doubles, 14s. 6d. to 15s.; rough slack, 10s. to 10s. 3d.; smithy peas, 17s. to 18s. 6d. West Yorkshire—Hartleys, 16s.; screened gas coal, 16s. 6d. to 17s.; washed trebles, 17s.; washed doubles, 15s. 6d.; washed singles, 14s. 6d.; washed smalls, 12s.; unwashed trebles, 15s. 6d.; unwashed doubles, 12s.; rough slack, 10s. 6d.; coking smalls, 10s.

Derbyshire and Notts.—Top hards, 19s. 6d. to 21s.; washed trebles, 17s. 6d.; washed doubles, 16s. 6d.; washed singles, 15s. 6d.; washed smalls, 11s. to 12s.; unwashed doubles, 13s. 6d. to 14s.; rough slack, 9s. 6d. to 9s. 9d. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 14s. 9d. to 17s. 6d.; gas coal, 18s. to 21s.; furnace coke, 18s. 6d. to 20s. per ton.

**Gas-Cooker as a Darkroom.**—A London photographer who one day last week found it urgently necessary to recharge the plate slides for his camera, surprised the Manager of the Davis Gas Stove Company, Oxford Street, by a request that he should be allowed to use as a dark room a large gas stove exhibited in the window. The stove was of the type used in hotels and restaurants, and was more than 5 ft. high and 3 ft. wide. The Manager obligingly consented, and, with a little adjustment, the stove was converted into a light-proof room. The photographer departed a few minutes later to secure important photographs.

**Guildford Gas Light and Coke Company.**—The Directors' report for the half-year ended June 30 states that there was an increase in the sales of gas of 11,162,000 c.ft., or 8·9 p.ct., as compared with the corresponding period of last year. The balance standing to the credit of the profit and loss account, including the amount brought forward from the previous account, is £13,510. Out of this sum the Directors recommend the payment of dividends as follows: On the preference stock at the rate of 5 p.ct. per annum (less income-tax); and on the consolidated ordinary stock at the rate of 7 p.ct. (less income-tax). This will leave £8685 to be carried forward.

# STOCK MARKET REPORT.

WHILE pessimistic views of the general trading conditions of the country continue, liberal supplies of loanable credits in Lombard Street last week resulted in the strengthening of investment values on the Stock Exchange. British Government Stocks were in demand under the lead of War Loan, and the 3½ p.ct. Foreign Government issues were firm. Brazilian bonds were prominent under the further improvement in the milreis, and German 7 p.ct. Loan advanced to 102.

Home Rails were not helped by the proceedings of the Trades Union Congress. Traffics, with the exception of the Southern, again recorded decreases.

In the Industrial Market, Artificial Silks were weaker, as were also Tobacco issues. On the other hand, Bradford Dyers, following some brisk buying, rose to 88s. 6d. The Iron, Coal, and Steel groups remained heavy, conditions not being improved by the passing of the Powell Duffryn interim dividend. Rubbers steadily appreciated, helped by a further list of increased profits; a slight fall in the commodity having no effect on prices.

It will be seen by the Table that the market anticipations of a steadying in the prices of Gas Stocks has not yet been realized. During the week the quotations of no less than eight stocks were marked-down a further 2 points, and supporters of these issues have an excellent opportunity of acquiring high-yielding investments. On the other hand, Chester 5 p.ct. Ord. advanced 2 points on the Liverpool Exchange.

The following transactions were recorded during the week:

On Monday, Brentford "A" 94½, Brighton and Hove "A" 120, Gas Light and Coke 79⅝, 80¼, 80⅜, 80¼, 80⅜, 4 p.ct. cons. pref. 77 and 78, 3 p.ct. cons. deb. 60, Imperial Continental 149, 149½, 150, 150½, Montevideo 68½, Primitiva 8s. 9d., 9s., 9s. 1½d., San Paulo 6 p.ct. pref. 8, South Metropolitan 90½, 91, 91½, 91¼, 91⅛, Wandsworth "B" 108. Supplementary prices, Barnet District "B" 140½, 141, "C" 140½, 141, Brighton and Hove 6 p.ct. "B" pref. 102, Gas Light and Coke 7½ p.ct. Ilford deb. 105½, 105⅝, St. Albans cons. 5 p.ct. 85¼, 85½, Woking District 10 p.ct. "A" 81.

On Tuesday, Brentford 5 p.ct. pref. 96½, Brighton and Hove "A" 121 *ex* div., Gas Light and Coke 80¼, 80⅜, 80½, 3½ p.ct. max. 61, 4 p.ct. cons. pref. 78, Imperial Continental 149, 150½, Montevideo 68¼, South Metropolitan 91½, South Suburban 5 p.ct. 95, 95½. Supplementary prices, Barnet District 102½, 103, Gas Light and Coke 7½ p.ct. Ilford deb. 105¼.

On Wednesday, Commercial 3 p.ct. deb. 57, Gas Light and Coke 79⅜, 79⅞, 80, 80¼, 80¼, 80⅜, 3½ p.ct. max. 61½, 3 p.ct. cons. deb. 60½, 60⅜, Liverpool 7 p.ct. pref. 105, 105½, Montevideo 67½, Primitiva 9s. 1½d., 9s. 4½d., South Metropolitan 91⅜, South Suburban 5 p.ct. deb. 96½, 97, Tottenham District "B" 3½ p.ct. 85. Supplementary prices, Brighton and Hove 6 p.ct. "D" pref. 97⅜, Cambridge University 5 p.ct. perp. deb. 95⅜, 95⅞, Oxford 5 p.ct. cons. 125.

On Thursday, Alliance and Dublin 65, 65½, Brentford "B" 93, British 107½, 7 p.ct. pref. 120½, Gas Light and Coke 80, 80¼, 80⅜, 80¼, 80⅜, 4 p.ct. cons. pref. 77, 78¼, 3 p.ct. cons. deb. 60½, Imperial Continental 150, 150½, Liverpool 7 p.ct. pref. 105, 105½, Primitiva 9s. 7¼d., 9s. 9d., South Metropolitan 91⅜. Supplementary price, Metropolitan (Melbourne) 9½.

On Friday, Alliance and Dublin 65¼, 65⅜, Bournemouth 6 p.ct. pref. 11½, Brentford "A" 95, British 7 p.ct. pref. 121½, Consett 4 p.ct. 79, 79½, 3 p.ct. deb. 57½, 58¼, Gas Light and Coke 80, 80¼, 80⅜, 80⅞, 3½ p.ct. max. 61½, 4 p.ct. cons. pref. 78, 78½, 3 p.ct. deb. 60, 61, Imperial Continental 140½, Primitiva 9s. 9d. Supplementary prices, Southgate and District 7 p.ct., max. 99½, 100.

In spite of there being plenty of money available, conditions in the Money Market have not actually improved. Withdrawal of gold for export continues, and the exchanges of other nations also moved against the £ sterling. Fresh accommodation was available at from 3 p.ct. down to 2½ p.ct. Discount rates were easier, but the Treasury Bill allotment was only 9d. lower than a week ago at £3 15s. 6·7d. p.ct.

Among the Foreign Exchanges, the New York rate fell to $4.84½, but recovered later, and closed at $4.84⅝. French and Belgian francs were at one time rather weak, but recovered before the close; the Paris cheque being 103.37½ francs, and the Brussels rate 110.25 francs. The Italian lire closed a trifle cheaper at 118⅝.

Silver was quoted at 33 1/16d. per oz., and Gold remained unaltered at 84s. 11½d.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on Aug. 6. Bankers' deposit rates are 2½ p.ct. The deposit rates of the discount houses are 2½ p.ct. at call and 2¾ p.ct. at notice.

| Issue. | Share. | When ex-Dividend. | Dividends. Prev. Hf.Yr. | Dividends. Last Hf. Yr. | NAME. | Quotations. Sept. 11. | Rise + or Fall − on Week. | Transactions Lowest and Highest Prices. |
|---|---|---|---|---|---|---|---|---|
| £ | | | % p.a. | % p.a. | | | | |
| 171,978 | Stk. | Aug. 13 | 5 | 5 | Aldershot 5 p.c. max. C. | 75—78 | .. | .. |
| 295,492 | " | " | 4 | 4 | Do. 4 p.c. Pref. | 69—74 | .. | .. |
| 1,351,868 | " | Apl. 2 | 6½ | 6½ | Alliance & Dublin Ord. | 63—65 | .. | 65½—65⅝ |
| 374,000 | " | July 9 | 4 | 4 | Do. 4 p.c. Deb. | 60—65 | .. | .. |
| 300,000 | 1 | May 7 | 1/7½ | 1/7½ | Bombay, Ltd. | ¾—1 | .. | .. |
| 170,000 | 10 | Aug. 13 | 8½ | 8½ | Bournemouth 5 p.c. | 12—13 | .. | .. |
| 425,050 | 10 | " | 7 | 7 | Do. B 7 p.c. | 12—12½ | — | .. |
| 150,000 | 10 | " | 6 | 6 | Do. Pref. 6 p.c. | 11—12 | .. | 11⅝ |
| 50,000 | Stk. | June 25 | 3 | 3 | Do. 3 p.c. Deb. | 56—59 | .. | — |
| 162,025 | " | " | 4 | 4 | Do. 4 p.c. Deb. | 77—80 | .. | .. |
| 992,043 | " | July 9 | 6 1/16 | 6 1/16 | Brentford A Con. | 93—98 | .. | 9 ½—95 |
| 990,500 | " | " | 6½ | 6½ | Do. B New | 93—98 | .. | 93 |
| 76,000 | " | " | 5 | 5 | Do. 5 p.c. Pref. | 94—97 | .. | 96½ |
| 306,690 | " | June 11 | 4 | 4 | Do. 4 p.c. Deb. | 75—80 | .. | .. |
| 181,337 | " | " | 6 | 6 | Do. 6 p.c. Rich. Red. Deb. | 100—105 | .. | .. |
| 214,740 | " | Aug. 27 | 12½ | 12 | Brighton & Hove Orig. | 161—166* | .. | .. |
| 244,200 | " | " | 9½ | 9 | Do. A Ord. | 119—122* | .. | 120—121 |
| 1,387,500 | " | July 23 | 5 | 5 | Bristol 5 p.c. max. | 89—91*a* | .. | .. |
| 855,000 | " | Mar. 19 | 8 | 7 | British Ord. | 105—110 | .. | 107½ |
| 100,000 | " | June 25 | 7 | 7 | Do. 7 p.c. Pref. | 120—125 | .. | 120½—121½ |
| 120,000 | " | " | 4 | 4 | Do. 4 p.c. Red. Deb. | 71—76 | .. | .. |
| 100,000 | 10 | May 21 | 6 | 8 | Cape Town, Ltd. | 6¼—7¼ | .. | .. |
| 100,000 | 10 | Apl. 23 | 4½ | 4½ | Do. 4½ p.c. Pref. | 5½—6½ | .. | .. |
| 150,000 | Stk. | June 25 | 4½ | 4½ | Do. 4½ p.c. Deb. | 69—74 | .. | .. |
| 626,860 | " | July 23 | 6 | 6 | Cardiff Con. Ord. | 93—101 | .. | .. |
| 237,860 | " | June 25 | 7½ | 7½ | Do. 7½ p.c. Red. Deb. | 101—104 | .. | .. |
| 157,150 | " | Aug. 13 | 6½ | 5 | Chester 5 p.c. Ord. | 93—95*b* | +2 | .. |
| 1,513,280 | " | July 23 | 5/14/8 | 5⅓ | Commercial 4 p.c. Cap. | 73—83 | −2 | 79—79½ |
| 560,000 | " | " | 5⅓ | 5/3/4 | Do. 3½ p.c. Cap. | 73—83 | −2 | .. |
| 475,000 | " | June 11 | 3 | 3 | Do. 3 p.c. Deb. | 56—59 | .. | 5⅜—58½ |
| 800,000 | " | 14 Jan. 15 | — | — | Continental Union, Ltd. | 35—40 | .. | .. |
| 200,000 | " | June 11 | 7 | 7 | Do. 7 p.c. Pref. | 88—91 | .. | .. |
| 660,000 | " | Aug. 13 | 6½ | 6½ | Croydon sliding scale | 96—100 | .. | .. |
| 284,975 | " | " | 5 | 5 | Do. max. div. | 81—84 | .. | .. |
| 492,270 | " | Aug. 13 | 9 | 6 | Derby Con. | 107—109*c* | .. | .. |
| 55,000 | " | June 25 | 4 | 4 | Do. Deb. | 74—76*c* | .. | .. |
| 1,002,180 | 10 | July 23 | 4 | 6 | European, Ltd. | 7—8 | +½ | .. |
| 16,460,070 | Stk | Aug. 13 | 5½ | 5½ | Gas Light & Coke 4 p.c. Ord. | 79—81 | −1 | 79⅞—80½ |
| 2,600,000 | " | " | 3½ | 3½ | Do. 3½ p.c. max. | 60—63 | .. | 61—61½ |
| 4,062,235 | " | " | 4 | 4 | Do. 4 p.c. Con. Pref. | 77—80 | .. | 77—78¼ |
| 4,761,930 | " | June 11 | 3 | 3 | Do. 3 p.c. Con. Deb. | 58—61 | .. | 60—61 |
| 130,000 | " | — | 10 | 10 | Do. 10 p.c. Bonds | .. | .. | .. |
| 42,000 | " | — | 7½ | 7½ | Do. 7½ p.c. Ilford Deb. | .. | .. | 105½—105⅝ |
| 82,500 | " | Mar. 19 | 6⅝ | 6⅝ | Hastings & St. L. 5 p.c. Conv. | 90—95* | −2 | .. |
| 258,740 | " | " | 5⅛ | 5⅛ | Do. 3½ p.c. Conv. | 71—76* | −2 | .. |
| 70,000 | 10 | May 7 | 10 | 10 | Hongkong & China, Ltd. | 17½—18½ | .. | .. |
| 86,600 | Stk. | Aug. 13 | 10 | 10 | Hornsey 7 p.c. | 132—137 | .. | .. |
| 1,976,000 | " | May 21 | 10 | 59 | Imperial Continental Cap. | 148—153 | .. | 149—150½ |
| 226,170 | " | Aug. 13 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. | 70—73 | .. | .. |
| 235,242 | " | Aug. 13 | 6½ | 6½ | Lea Bridge 5 p.c. Ord. | 94—99 | .. | .. |
| 2,127,340 | " | Aug. 13 | 5½ | 5½ | Liverpool 5 p.c. Ord. | 82½—83½ | −½ | .. |
| 600,000 | " | Mar. 19 | 7 | 7 | Do. 7 p.c. Red. Pref. | 104—106*b* | .. | 105—105½ |
| 165,736 | " | Aug. 27 | 8 | 9 | Maidstone 5 p.c. Cap. | 118—128* | .. | .. |
| 63,480 | " | June 25 | 3 | 3 | Do. 3 p.c. Deb. | 55—60 | .. | .. |
| 75,000 | 5 | June 25 | 3 | 7 | Malta & Mediterranean | 4—4½ | .. | .. |
| 541,920 | Stk. | June 11 | 4 | 4 | Montevideo, Ltd. | 65—69 | .. | 67½—68½ |
| 2,061,315 | " | Aug. 13 | 5 | 5 | Newcastle & Gateshead Con. | 71—72*d* | .. | .. |
| 300,929 | " | " | 4 | 4 | Do. 4 p.c. Pref. | 75½—76½*d* | .. | .. |
| 529,705 | " | June 21 | 3½ | 3½ | Do. 3½ p.c. Deb. | 66—68*d* | .. | .. |
| 15,000 | " | Aug. 27 | 12 | 11½ | North Middlesex 10 p.c. | —* | .. | .. |
| 75,940 | " | " | 8⅜ | 8 3/16 | Do. 7 p.c. | —* | .. | .. |
| 300,000 | Stk. | May 7 | 9 | 7 | Oriental, Ltd. | 100—105 | .. | .. |
| 188,120 | " | June 25 | 7½ | 7½ | Plym'th & Ston'house 5 p.c. | 108—113 | .. | .. |
| 60,000 | 50 | Aug. 27 | 14 | 14 | Portsea Island B | 93—96* | .. | .. |
| 100,000 | 50 | " | 13 | 13 | Do. C | 90—93* | .. | .. |
| 2,289,909 | 1 | — | — | — | Primitiva Ord. | 8/9—9/9 | .. | 8/9—9/9 |
| 302,600 | 100 | June 2 | 4 | 4 | Do. 4 p.c. Red. Deb. | 78—80 | .. | .. |
| 600,000 | Stk. | July 23 | 4 | 4 | Do. 4 p.c. Red. Deb. 1911 | 62—64 | .. | .. |
| 193,744 | " | June 25 | 4 | 4 | Do. B. Aires 4 p.c. Rd. Db. | 63—65 | .. | .. |
| 264,496 | " | " | 4 | 4 | Do. R'r P'te 4 p.c. Rd. Db. | 63—65 | .. | .. |
| 150,000 | 10 | Mar. 19 | 6 | 6 | San Paulo 6 p.c. Pref. | 7½—8½ | .. | 8 |
| 125,000 | 50 | July 1 | 5 | 5 | Do. 5 p.c. Red. Deb. | 42—45 | .. | .. |
| 270,000 | Stk. | Mar. 19 | 5½ | 5½ | Sheffield A | 101—102*e* | −2 | — |
| 419,968 | " | " | 5½ | 5½ | Do. B | 101—102*e* | −2 | — |
| 1,047,000 | " | " | 5½ | 5½ | Do. C | 101—102*e* | −2 | .. |
| 90,000 | 10 | June 11 | 6 | 4 | South African | 7—9 | .. | .. |
| 6,609,895 | Stk. | Aug. 13 | 6½ | 5 | South Met. Ord. | 90—92 | .. | 90½—91½ |
| 1,893,445 | " | July 9 | 3 | 3 | Do. 3 p.c. Deb. | 57—60 | .. | .. |
| 734,000 | " | Mar. 5 | 6½ | 6½ | Do. 6½ p.c. Red. Deb. | 101—103* | −1½ | .. |
| 91,500 | " | Aug. 13 | 8½ | 8½ | South Shields Con. | 132—133*d* | .. | .. |
| 1,187,795 | " | July 23 | 6½ | 6½ | South Suburban Ord. 5 p.c. | 92—97 | .. | 95—95½ |
| 368,837 | " | June 25 | 5 | 5 | Do. 5 p.c. Deb. | 95—98 | .. | 96½—97 |
| 647,740 | " | May 7 | 5 | 5 | South'mpt'n Ord. 5 p.c. max. | 80—83 | .. | .. |
| 121,275 | " | June 25 | 4 | 4 | Do. 4 p.c. Deb. | 70—75 | .. | .. |
| 250,000 | " | Aug. 27 | 7 | 7 | Swansea 7 p.c. Red. Pref. | 100—102* | .. | .. |
| 200,000 | " | June 25 | 6½ | 6½ | Do. 6½ p.c. Red. Deb. | 101—103 | .. | .. |
| 120,000 | " | July 23 | 8 | 7½ | Tottenham District A 5 p.c. | 113—116 | .. | .. |
| 882,275 | " | " | 6½ | 5⅞ | Do. B 3½ p.c. | 85—90 | −2 | 85 |
| 150,000 | " | July 9 | — | 28/4 | Do. 5½ p.c. Pref. | 103—105 | .. | .. |
| 181,455 | " | June 11 | 4 | 4 | Do. 4 p.c. Deb. | 76—79 | .. | .. |
| 259,851 | " | Mar. 19 | 5 | 5 | Tynemouth Con. and New Uxbridge, Maidenhead, & | 72—74 | .. | .. |
| 197,294 | " | Aug. 27 | 6⅞ | 6½ | Wycombe 5 p.c. | 93—98* | .. | .. |
| 88,330 | " | " | 5 | 5 | Do. 5 p.c. pref. | 93—98* | .. | .. |
| 91,800 | " | " | 6½ | 6½ | Do. 5 p.c. Maidenh'd | 88—93* | .. | .. |
| 30,000 | " | July 9 | 9½ | 8½ | Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c. | 125—130 | .. | .. |
| 855,636 | " | " | 7½ | 7 | Do. B 3½ p.ct. | 107—112 | .. | 108 |
| 392,955 | " | " | 6/9/6 | 5/19/0 | Do. C and New | 93—96 | .. | .. |
| 352,000 | " | " | 7⅜ | 6½ | Wimbledon 5 p.ct. | 100—105 | .. | .. |
| 98,000 | " | " | 7⅛ | 7⅛ | Epsom 5 p.ct. | 109—112 | .. | .. |
| 88,416 | " | June 25 | 5 | 5 | 3 p.c. Deb. | 56—59 | .. | .. |

Quotations at:—*a*,—Bristol, *b*,—Liverpool, *c*,—Nottingham, *d*,—Newcastle, *e*,—Sheffield. * Ex. div.

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**THE FLOW OF GASES and PROPORTIONING GAS MAINS.**

By

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## CURRENT SALES OF GAS PRODUCTS.

### The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 14.

There is a better market for pitch, and it is reported that considerable quantities are passing hands on the basis of 40s. to 41s. net per ton f.o.b. makers' works.

The recent demand for creosote continues, and the price of this oil is now from 6¾d. to 6⅞d. net per gallon, in bulk.

Pyridine remains fairly steady at about 20s. per gallon. There is, however, a very poor demand for naphthalene and anthracene.

Benzole 90's at 1s. 8½d. per gallon, pure toluole at about 2s. 2d. per gallon, and 95/160 solvent naphtha at about 1s. 9d. per gallon continue in good demand.

### Tar Products in the Provinces.

*Sept.* 14.

Markets for tar products remain practically unchanged.

Pitch is still very dull, and a fair amount of business is reported to have been done on the Continent on the basis of 38s. f.o.b. East Coast.

Creosote is steady. There seems to be a little more inquiry on the part of both home and foreign buyers.

Water white products remain firm. Solvent naphtha continues to be in fair demand; but prices are slightly easier if anything. There also appears to be rather more benzole offering.

Carbolic and cresylic are still being offered at prices which are below the cost of production.

Naphthalene remains neglected.

The average values for gas-works products during last week were: Gas-works coal-tar, 25s. to 30s. Pitch, East Coast, 37s. 6d. to 38s. 6d. f.o.b. West Coast—Manchester, 32s. 6d. to 33s. 6d.; Liverpool, 33s. 6d. to 34s. 6d. Clyde, 32s. 6d. to 37s. 6d. Benzole, 90 p.ct., North, 1s. 7½d. to 1s. 8½d.; crude, 65 p.ct., at 120° C., 1s. to 1s. 1d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 7½d. to 1s. 8¼d. Toluole, naked, North, 1s. 6¼d. to 1s. 7¼d., nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8¼d. Solvent naphtha, naked, North, 1s. 4¼d. to 1s. 6d. Heavy naphtha, North, 1s. to 1s. 2d. Creosote, in bulk, North, liquid, 5⅝d. to 5¾d.; salty, 5¼d. to 5⅜d.; Scotland, 5⅜d. to 5⅝d. Heavy oils, in bulk, North, 6¼d. to 6⅜d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality unsaleable.

### Manchester District Tar Prices.

The average prices realized for the sale of tar, according to the sliding-scale, for the months of April, May, and June, were £2 9s. 2·10d., £2 8s. 5·76d., and £2 7s. 5·43d. respectively.

## Falmouth Gas Company.

The annual meeting of the Company was held on Tuesday, Sept. 1—Mr. F. J. Bowles, J.P. (Chairman), presiding. The report of the Directors showed an increase in the sales of gas of over 4 million c.ft.; the total output for the year being 63,293,200 c.ft. The increase in the number of gas appliances sold, it is stated, was remarkable. An interim dividend of 5 p.ct. (less income-tax) was paid up to Dec. 31 last; and the Directors recommend the payment of a final dividend of 7½ p.ct. for the year ended June 30 last, transferring ½ p.ct. to the reserve fund, and carrying forward the balance to profit and loss account. The Chairman, moving the adoption of the report, said they had passed through another year of steady progress from every point of view. On the whole, while the various items fluctuated, the totals of receipts and expenditure were very near those of last year; the difference being represented by an increased profit of £258. The increased sale of appliances of all kinds—an increase of over £1000—made it necessary to display them better; and they had decided to remodel the existing showrooms.

**Gas Meter Testing at Glasgow.**—In his report on the work of the Gas Meter Testing Department for the year ended May 31, Mr. S. B. Langlands, the Inspector, states that the total number of meters tested was 41,287, and the amount of fees collected £2578. These figures are a decrease on those of 1924. Of the total number of meters tested, 14,252 were new meters, 26,240 were repaired meters, and 795 were sent in by gas consumers for certification as to correctness.

## Dunfermline Gas Undertaking.

In his annual report on the working of the gas undertaking for the year ended May 15, Mr. James Campbell, the Engineer, states that the expenditure on revenue account amounted to £54,271, and the income to £65,074, giving a gross profit of £10,802, to which falls to be added the sum of £4139, brought forward from last year, making a total of £14,942. From this sum are deducted payments for interest and sinking fund, income-tax, expenses of management of consolidated loans fund, and stamp duty on mortgages, amounting to £17,630, leaving a debit balance of £2688 to be carried forward. The quantity of gas made during the year amounted to 355,644,000 c.ft.—an increase of 16,958,000 c.ft., equal to 5 p.ct. The net income from residual products was £17,195, equal to 16s. 7¼d. per ton of coal carbonized, or 66·14 p.ct. of the cost. A waste-heat boiler was put to work in January last, and has proved to be of the greatest service. Coals purchased for boiler firing formerly cost about £1300 per annum, the whole of which is now saved, and, in addition, a better supply of steam is available for works purposes. A plant for the preparation of road tar was started in June, and already a considerable quantity of tar has been treated and sold. Even now it can be said that the money expended on the plant will yield an excellent return. The total length of mains laid, both new and renewal, amounted to 2588 yards. A contract has been placed with the Woodall Duckham Company for the erection of an additional retort house of the same size as the existing one, but providing in the meantime for only eight retorts, together with coal and coke handling plant; and it is hoped to start this work shortly. Owing to the decreased returns from residuals, it has been necessary to increase the price of gas from 2s. 6d. to 2s. 10d. per 1000 c.ft. This increase is to take effect as from Aug. 15.

**Darwen Gas Department.**—The annual report of the Darwen Borough Treasurer shows that the Gas Department finished the year with a loss of £3256. Compared with 1914, the consumption of gas was down by 9,400,000 c.ft., and compared with last year the sales were 949,000 c.ft. down. Since 1923 the price of gas for ordinary lighting has been reduced by 1s. 2d. per 1000 c.ft.

**Aldershot Gas, Water, and District Lighting Company.**—As advertised in this issue of the "JOURNAL," Messrs. A. & W. Richards are offering for sale by tender £60,000 4 p.ct. consolidated preference stock (irredeemable) in the Aldershot Gas, Water, and District Lighting Company. The minimum price of issue is £70 per £100, yielding at that price £5 14s. 4d. p.ct. Tenders should reach Messrs. Richards at No. 37, Walbrook, E.C. 4, not later than 11 o'clock on Thursday, Oct. 1.

**Scottish Shale Oil Industry.**—Sir Burton Chadwick, M.P., Parliamentary Secretary of the Board of Trade, last week received a deputation consisting of Mr. Walter Nellies (General Secretary), Mr. O'Hagan, Mr. M'Kelvie, and Mr. Foster, representing the National Union of Shale Miners and Oil Workers, with regard to the position which has arisen in the Scottish shale oil industry as the result of a notification by Scottish Oils, Ltd., that it will be necessary to close down certain oil works and mines and to reduce the wages of the workpeople at the remaining works and mines. Sir Burton Chadwick, who was accompanied by Mr. J. A. N. Barlow, C.B.E. (Ministry of Labour), Mr. J. Lamb, C.B. (Scottish Office), Mr. R. S. Meiklejohn, C.B. (Treasury), Mr. I. J. Wills and Mr. L. J. Jeffery (Petroleum Department, Board of Trade), and Mr. J. G. Henderson, O.B.E., M.C. (Private Secretary), stated that for some time past there had been communications between the Government and Scottish Oils, Ltd., but that the Government had not seen their way to grant any special financial assistance to the Scottish shale oil industry.

On the invitation of Mr. W. B. M'Lusky, the Engineer and Manager of the Halifax Gas Department, the members of the Halifax Rotary Club recently visited the gas-works. The works are particularly valuable for purposes of demonstration, as they include inclined, horizontal, and vertical retorts, and complete gasification plant.

The Newport (Salop) Urban Council last week had before them a tender from the local Gas Company for the lighting of 90 street lamps at a cost of £300 15s., less 10 p.ct. discount, the lighting time to be extended by half-an-hour. The recommendation to increase the lighting hours was not agreed to, and the Company were asked to submit a revised tender. The amended tender of £261 9s. was then agreed to. This amount is £31 3s. more than last year.


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(Signed) GEO. T. LEWIS,
Clerk to the Council.

Council Offices,
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